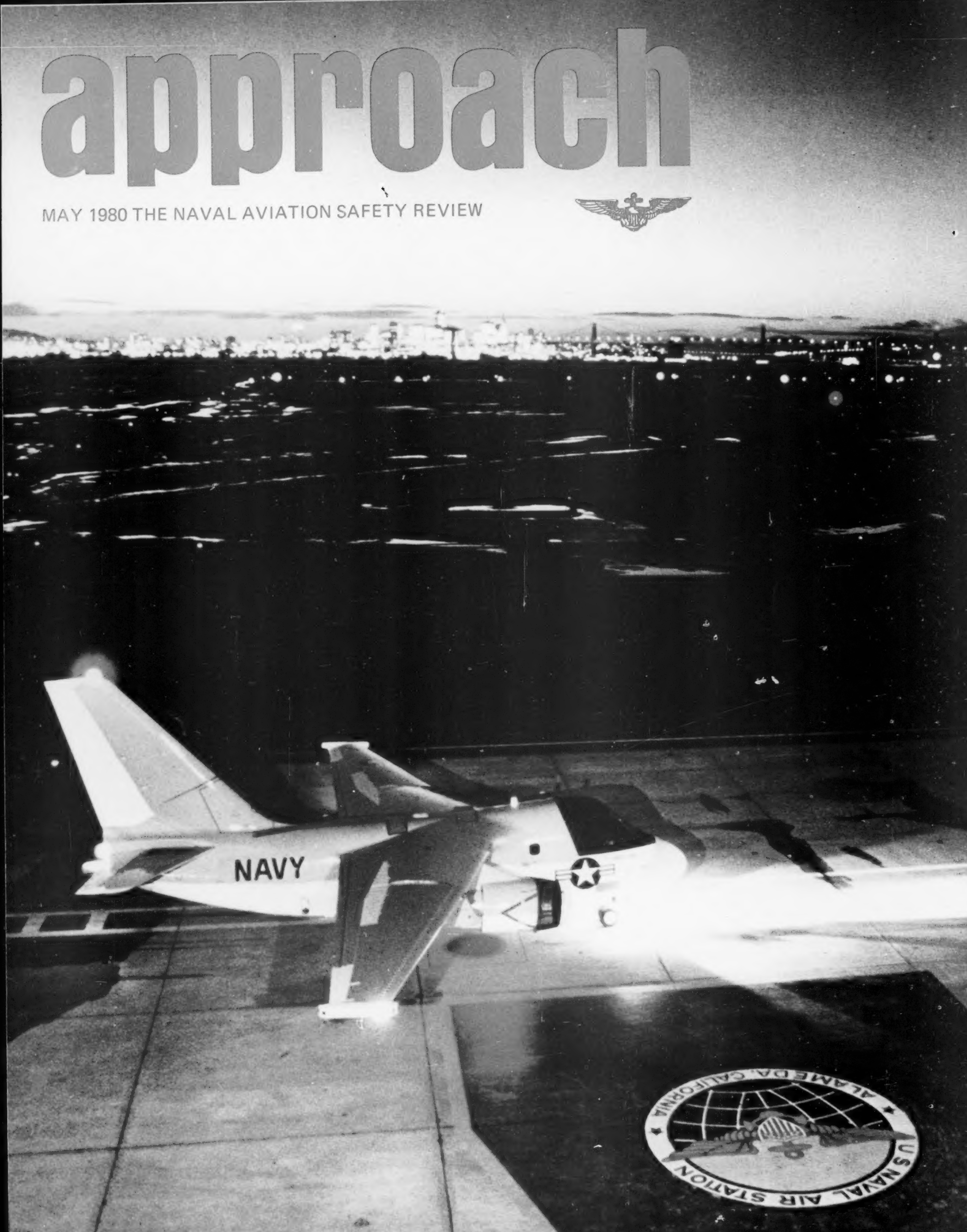
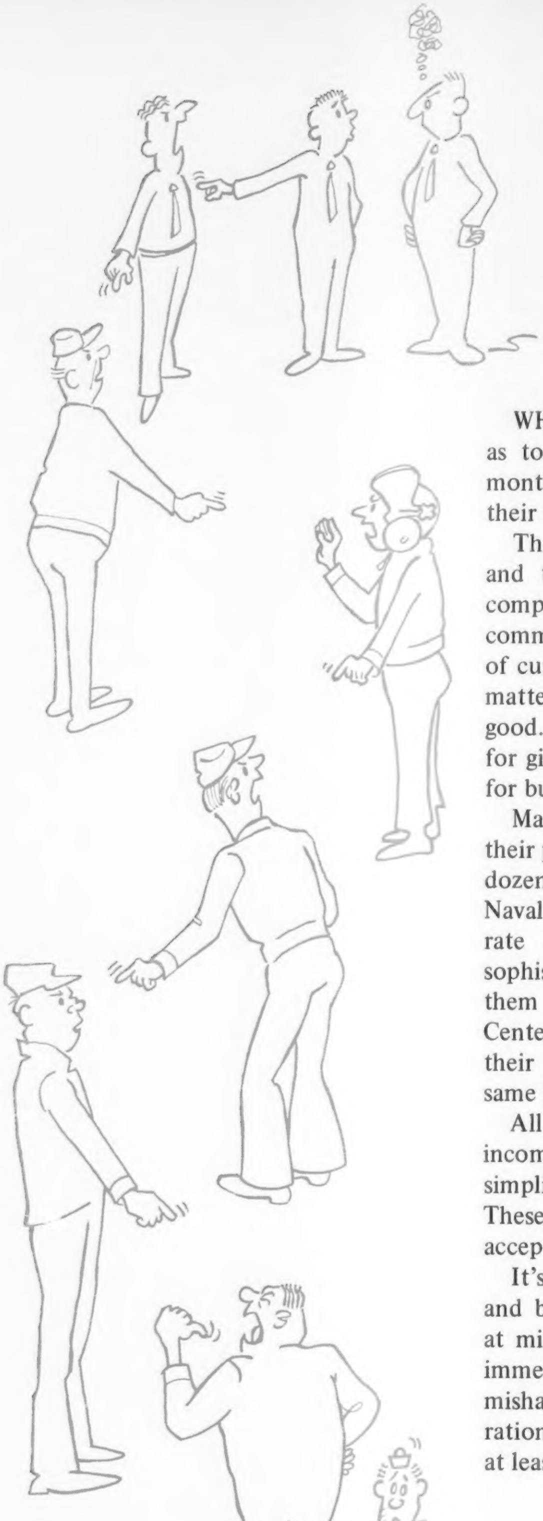
approach

MAY 1980 THE NAVAL AVIATION SAFETY REVIEW



IT'S THEIR FAULT!



WHEN you begin to question people involved in naval aviation as to why our accident rate has increased dramatically in recent months, you almost invariably get an answer that boils down to, "It's their fault!"

The more senior aviators point their fingers at the young punks and talk about their inexperience, their reliance on systems to compensate for lack of airmanship, and generally, their lack of common sense. The younger pilots point back at their seniors' lack of currency, overconfident attitudes, and tendencies to scrub safety matters in order to get missions accomplished and come out looking good. Just about every pilot will throw a few rocks at maintenance for giving them broken aircraft and at Naval Air Systems Command for buying junk in the first place.

Maintenance personnel question how a pilot can take out one of their perfectly good airplanes and bring it back in 2 hours with over a dozen discrepancies, or fail to bring it back at all. The experts at Naval Air Systems Command point to the pilot factor accident rate and wonder what is the use in designing or purchasing sophisticated safety and survival systems so that some idiot can take them out and fly into the side of a mountain. The Naval Safety Center looks at the Fleet and sees people choosing to ignore all their preventative safety information and continuing to make the same fatal mistakes.

All of these "answers" have a basis in fact, yet they are all incomplete (not to mention parochial). They all attempt to oversimplify the problem, and thus become problems in themselves. These statements, or attitudes, reflect a great reluctance by all to accept responsibility for our aircraft mishaps.

It's past time for all of us to quit pointing fingers at each other and begin to take good, hard looks at ourselves. Instead of looking at mishaps in terms of "What did they do this time?", we should immediately question what we could have done to prevent the mishap. We have to stop running around so secure in the rationalization that **it's their fault** and consider the possibility that, at least to some extent, **it's our own fault**. ◄

Vol. 25 No. 11

approach

NAVAIR 00-75-510

The S-3 Viking on this month's cover was just out of rework at NARF Alameda and was being tested for taxi when this photo was taken. (A MERCO INTERNATIONAL photo submitted by Mr. Earl Smith.)

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Ready for

FINDING a letter from the Bureau in your mailbox, you open it to read: "Expect, within 2 weeks, official confirmation of orders to AIRFERRON 31 [VRF-31, Aircraft Ferry Squadron THIRTY-ONE], NAS Norfolk, Virginia."

"Oh my God!" you say to yourself, remembering the airplane you signed off as being "up" only because you knew it was being transferred to NARF by the ferry squadron. Think back on the marginal conditions you let pass – "What does this mean? Does everyone do that to these guys? Am I going to fly junk like that?" – and the apprehension begins to build.

Maybe this will happen to that lieutenant (jg) at one NAS who, after returning from a hop, answered his maintenance chief's question, "Is she up?" with, "Good enough for the ferry squadron." This happened while a senior ferry-mission aviator stood in maintenance control checking a pile of outstanding MAFs on another bird so called "ready for ferry." The senior aviator commenced to realign the lieutenant's mental perspective.

While researching the material for this article, I read past APPROACH articles written about the ferry mission. One, from the September 1963 issue by CDR Billy Carroll, listed five unique problems of the ferry squadron. These haven't changed much, and for your benefit, are reprinted here.

- They fly practically every type (model) of aircraft the Navy has in its inventory. (This also includes the Marine Corps.)
- Aircraft material conditions run the gamut from brand new to safe for one-time ferry flight.
- Each ferry pilot, being qualified in (several) different models of aircraft, must carry pocket checklists plus flight and safety equipment for each aircraft in which he is qualified on every trip.
- The very nature of the operation requires that the ferry pilot end practically every hop at a different field, with its peculiar traffic patterns and layout, and include many overseas ferry flights to, or through, foreign countries.
- The ferry pilot is seldom able to utilize his own squadron personnel for servicing, preflight, or repair of an aircraft being ferried.

In all its years, the ferry mission remains basically the same, as do the safety problems.

To expound further, consider the mission and flight routing on the typical ferry flight. The terrain covered varies from desert to bayou, mountains to open water. Weather on a single mission may run the gamut of hot, dry, desert duststorms to freezing rain and snowstorms. One good example is the helo run from NAS Whidbey Island, Washington, to the Corpus Christi Army Depot in Texas. And of course there are the transoceanic flights by multiengine aircraft through foreign airspace and over unfamiliar land areas.

Many think the ferry squadron flies day VFR only. Although true many years ago, this no longer applies. Ferry pilots have the same annual instrument and nighttime requirements as any other Fleet aviator.

Contrary to popular opinion, ferry pilots also have ground responsibilities. In VRF-31, these take on multidimensional proportions. The challenge is evident. The NATOPS Department cares for manuals covering nearly every model/series of aircraft in the Navy and Marine Corps inventory. The latest count was 36 models and 102 series. NATOPS changes arrive by the wheelbarrow full. The schedules officer is required to coordinate pilots and aircrewmen with the proper qualifications, at the proper location, and at the right time. In 1979, he was responsible for moving a monthly average of 257 aircraft. The training officer has the responsibility for the currency and qualifications of all officer and enlisted flight personnel, each in several models of aircraft. The safety officers must have a working and textbook knowledge of the 36 models and 102 series.

Where does it end? It doesn't. How much confusion do you think there can be in jumping from one aircraft to the next? Changes in start and emergency procedures, unique names for

ferry?

By LT Steve Duffy
VRF-31

similar systems, instrument panel configuration differences, locations of switches, throttles, fire handles; all this and more can vary from model to model, series to series. Therefore, a most important facet of this business is professionalism on the part of both the Fleet and the ferry pilots. Let's focus first on the Fleet's attitude.

Though the ferry pilot's job is no easy one, it seems obvious that the most important part of a safe-for-ferry formula lies in the transferring squadron's pride of ownership. Only aircraft in top condition should be released for ferry flight, but that isn't always the case. Of course there are the one-time flights, but even these planes should be as ready as their condition will allow. The NAS incident which opened this article entailed approximately 40 outstanding MAFs on the bird *ready for ferry,* and a similar stack on the one flown by the lieutenant (jg). These were gripes on such equipment as the primary attitude system, questionable alignment of the inertial platform, problems with the fuel quantity indicators, etc. This plane was to be delivered to the opposite coast, a journey well over 2500 miles. Was this a true indication of the squadron's pride?

The attitude "good enough for ferry" is an infectious disease from which sayings like "Truckin' Trash" and "Trash Haulers" originate. Long before the Bee Gees wrote their song, "Stayin' Alive," it was a ferry mission motto. And believe it or not, despite the latent dangers, truckin' is the fun part.

As for ferry flightcrews, their worth is proven when successfully completing a mission. But as the VRF-31 flight safety brief states, "You can deliver an aircraft all the way across country, walk away from it, and still not have honestly accomplished the mission as stated." That mission, delineated in OPNAVINST 3710.6 series, is "safe, expeditious, and cost effective delivery."

Minimizing risks is the name of the game, and the ferry

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Complacency cannot be allowed to creep into his *modus operandi* lest incomplete preflights and preflight planning result. A ferry pilot never knows if the bird he is about to transfer was the squadron's *hangar queen.*

crews have a bag of tools to help them in this effort. One of these is the squadron's open safety program. The ferry squadron has never tried to be a cloak-and-dagger outfit. Pilots share their hairy tales so that their fellow aviators may benefit and avoid the same experience. Out of this atmosphere came "Anymouse," originated in 1945 by the VRF-31 ASO, and officially adopted by the Safety Center in 1953.

Another tool is the constant spurning of complacency. A pilot's worst enemy, complacency cannot be allowed to creep into his *modus operandi* lest incomplete preflights and preflight planning result. A ferry pilot never knows if the bird he is about to transfer was the squadron's *hangar queen.* He must be thorough, paying attention to detail. He cannot put total trust in the weather guesser. When on the road, even the slightest problems are magnified. Since every hop will probably end at a different field, repair facilities are not always available.

Let anything slip, and an accident may be just around the corner. In today's world of aviation, no one can afford an aircraft accident. Statistics show that in 1978, of the Navy's 134 major aircraft accidents, 128 fatalities resulted, costing an average of $3.4 million per accident. In 1979, of the 128 major aircraft accidents, 74 fatalities resulted. The average cost per accident was $2.3 million. These costs are misleading, as they represent the depreciated value of the aircraft and not the replacement cost. Compare this to 1933 statistics, when 449 major aircraft accidents occurred – only 14 fatalities resulted and the cost averaged $2500 per accident.

One can see, with the increasing sophistication and speed of our aircraft, the chances of surviving a major aircraft accident are slim. If you *jet jocks* are thinking you will simply eject, then get a load of this. Of the 79 total ejections occurring in 1978, 16 (or 20 percent) resulted in fatalities.

Safety, therefore, should be a primary concern. With ferry mission crews, it is a respected topic, carefully nurtured and developed in each person. Because they are on their own most of the time, they live primarily by their own judgment and decisions. They must weigh the situations confronting them, temper their can-do attitude with the mission priority, and decide if man and machine are truly *ready for ferry.*

There is a large number of very experienced aviators in the squadron, and they are proof of the old cliche, "There are old pilots and there are bold pilots, but there are no old, bold pilots." Safety with them is an inner conviction, a self-discipline. A junior aviator compared to these men, I quickly learned to respect them as sincere, conscientious professionals. Flying with them has been a pleasure and a learning experience. They play the game by the rules, minimize the risks, and still have fun doing the job.

So when you have an aircraft to be transferred, safe and expeditious delivery will be the result of two attitudes, that of your squadron in preparing the bird for ferry, and that of the ferry pilot assigned to move it. When the ferry pilot arrives, don't be offended because he goes over the aircraft with a fine-tooth comb, even if it was your CO's favorite. Rein in your irritation if he demands repair work before accepting it. Remember, the odds are not in his favor. He is just doing his job, minimizing the risks, and working at "Stayin' Alive."

Experience is a wonderful thing. It enables you to recognize a mistake when you make it again.

Ace L.

ANSWERS ABOUT THE FLU- 8/P

By LCDR G. Bender
NADC

THE LPA life preserver automatic inflation device, FLU-8/P, has recently been introduced into the Fleet. This article is intended to update the user (crews flying ejection seat aircraft) on the current status of the FLU-8/P and to discuss a few areas of concern which may arise during familiarization or use of the device.

In review, the FLU-8/P is an automatic-operating, water-sensing, gas-release system with the ability to differentiate between mere high humidity (or rain) and actual immersion in water. Immersion actuates a small sensing element that feeds an integrated-logic circuit powered by a silver oxide-type battery; the resultant electrical power initiates an explosive cartridge to drive a piercing pin into a CO_2-filled cylinder, releasing the gas to inflate the life preserver. The unit can also be actuated by a manually-operated lanyard which is identical to present actuation systems. Three key points to remember are:

- The device has an electronic sensor – thus, the need for batteries and the possibility of corrosion.
- The device uses a small explosive charge to puncture the CO_2 cylinder, and thus is a one-time-use item which will require a few precautions during storage and some periodic testing. The unit has a 3-year life.
- All the features of the present-day, manual actuation device are available with the FLU-8/P. Preinflation prior to water contact is accomplished through the manual mode of actuation.

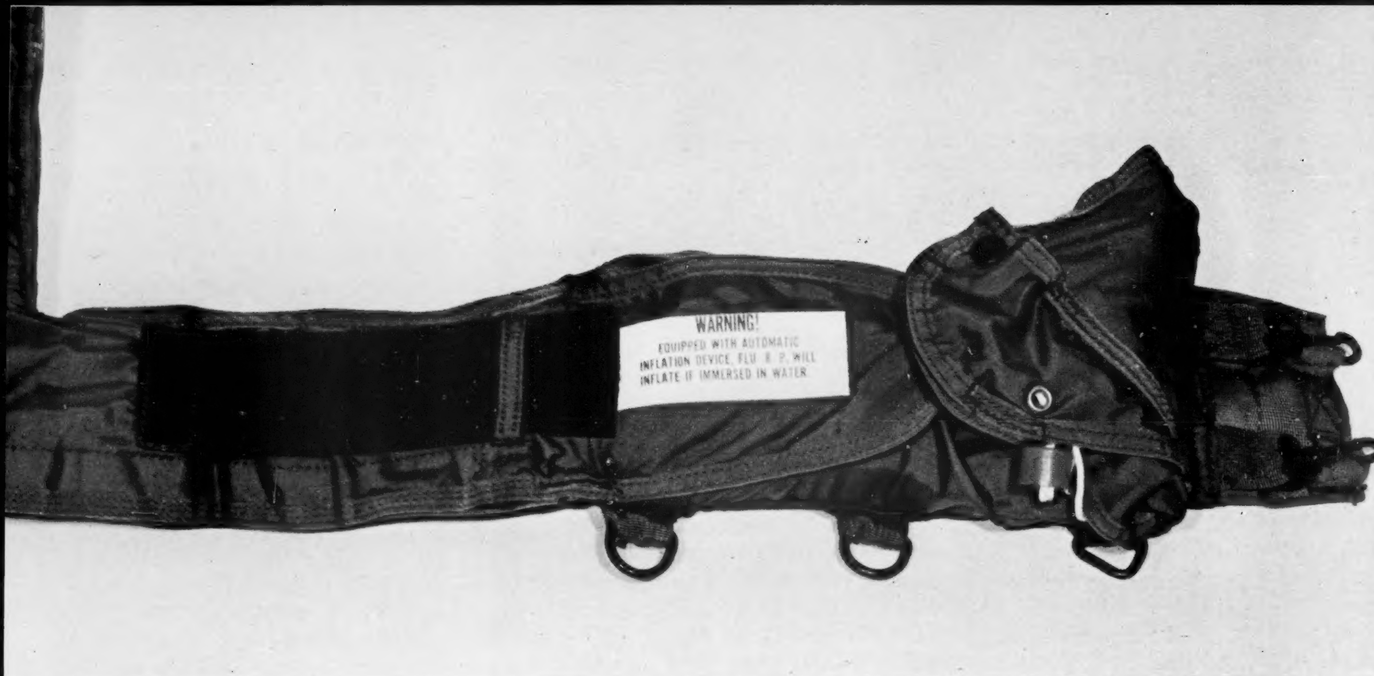
It should be emphasized that the FLU-8/P is designed for use in high performance, ejection seat aircraft only, where ditching is not a recommended NATOPS procedure. The sensor is not designed to differentiate between a crewman still in the aircraft or out in the open ocean.

From 1974 to 1979 there were 74 aircrewmen involved in mishaps on and around the carrier in the categories of cat shots, ramp strikes, and over-the-side mishaps. Five of these aircrewmen elected to ride the aircraft into the water. Only one of these aircrewmen escaped, for a survival rate of 20 percent. Of those 69 aircrewmen who ejected from the same scenarios, 68 percent survived; thus, ejection is clearly the preferred route of escape. Of the 22 fatalities after ejection, eight could probably have been saved had the FLU-8/P been available. Thus, the tradeoff is clear – try to save lives by emphasizing ejection as the best route of escape from these types of mishaps and by making the ejection more survivable.

If ditching is your only alternative, all is not lost. The FLU-8/P does not fire instantaneously upon water contact. A short period (0-3 seconds) is required for water to reach the sensor and inflate the LPA (8-15 seconds for full inflation). Thus, if ditching occurs and you follow NATOPS procedures, escape should not be severely restricted.

Aircrew Systems Change 396 replaced the 28-gram CO_2 cylinder with the 35-gram cylinder in order to eliminate the problem of the LPA collar lobe not opening. The FLU-8/P was designed before the solution to this problem was found; thus, the first shipment of FLU-8/Ps must use the 28-gram CO_2 cylinder. A modification has already been evaluated which will

Waist lobe casing opened, showing proper installation of FLU-8/P.



FLU-8/P installed in LPA waist lobe (note label indicating FLU-8/P installation).

allow the use of the 35-gram bottle, and this modification will be incorporated in the near future. The original issue of FLU-8/Ps will have the 35-gram CO_2 cylinder in the packet, so it must be replaced with the 28-gram cylinder. Don't throw away the 35-gram bottles, as they will be reinstalled when the subsequent change is instituted.

Some cautions you should be aware of when using the new FLU-8/P are:

• With the 28-gram cylinder, if the collar lobes fail to inflate, grasp the waistlobes under the arms and squeeze to force CO_2 into the collar lobes. The velcro securing the collar lobe casing can also be opened manually.

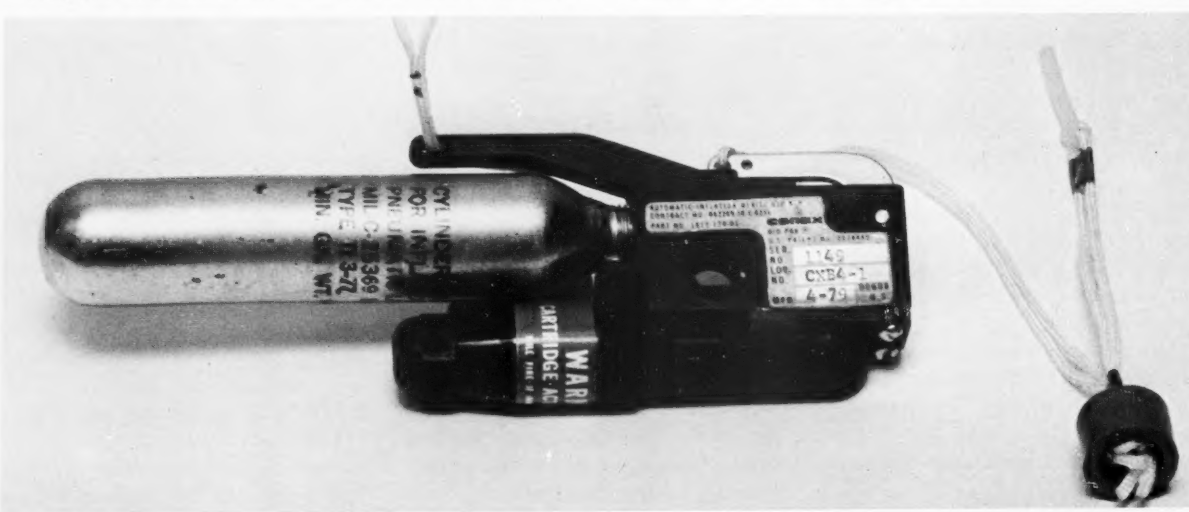
• **The automatic inflation device is designed for use in high-performance, ejection seat aircraft only.** LPAs equipped with the device shall not be used aboard non-ejection seat aircraft. If the vest inflates on ditching, escape may not be possible from a cabin-type aircraft.

• No preflight of the device is required by the pilot. If a question arises, take it to your PR.

• The squib charge has been thoroughly tested and is not subject to detonation by heat, impact, or electromagnetic radiation.

• The procedures taught at Aviation Physiology and Water Survival Training for preinflation of the LPA prior to water entry are still valid. The manual mode of actuation is still the primary mode. But, should the need arise, the FLU-8/P is a very reliable backup.

If any questions or problems arise in the incorporation or use of the new FLU-8/P, please give us a call at the Fleet Liaison Office, NAVAIRDEVCEN, Autovon 441-2847.



FLU-8/P automatic inflation device, including water sensing element, battery, explosive squib, piercing mechanism, CO_2 cylinder (28 gram), and manual actuation mechanism.

air breaks

By the Book. After an hour and a half, the reserve *Corsair II* pilot completed a 5G turn at 12,000 feet, 300 knots. Simultaneously, he heard and felt a loud bang and his wingman reported light brown smoke coming from the tailpipe. Checking his gages, the pilot observed the oil pressure to read 60 psi. Shortly thereafter, the TIT went to 1200 degrees, the oil pressure went from 60, to 40, to 55, and finally dropped to zero! The wingman moved to his leader's "six" and reported fire coming from the turbine area. To add to the pilot's plight, a total electrical power failure occurred and the controls began to stiffen! The pilot extended the EPP and slowed the A-7 to 215 knots. At 8000 feet, 220 knots, he observed the master caution lights "on" and the oil pressure still at zero. An unsuccessful airstart, in manual fuel, dictated his next procedure – ejection.

At 3000 feet, 220 knots, seat and visor lowered, he ejected using the face curtain. Getting a good chute, he deployed the seat pan (the raft inflated only partially) and inflated his LPA prior to entering the lake below. Rescue was almost immediate. A small fishing boat picked up the pilot, who was able to walk (swim) away with only minor injuries.

This pilot did just about everything by the book (NATOPS and survival), but unfortunately the aircraft wouldn't cooperate. The procedures that he followed are indicative of the entire NATOPS and training programs followed by reserve and regular naval aviators on a daily basis. Well done!

Unbriefed Thunderstorms. The *Prowler* was climbing downwind in a night CCA pattern when, at 1000 feet MSL, it was struck by lightning. The cockpit of the EA-6B began to fill with smoke and the crew observed an extremely bright flash, accompanied by a simultaneous loud explosion. The pilot declared an emergency and continued downwind for landing. The aircraft's electrical power and all other systems continued to function normally and, within 5 minutes, the smoke had cleared via the normal air-conditioning system. The *Prowler* made an uneventful, arrested landing without further incident.

The weather brief gave no indication of thunderstorm activity in the immediate area. However, the weather deteriorated enough during the CCA period to necessitate Mode III approaches. Although this changing weather phenomenon prevented ACLS "lockup," the crew of the EA-6B had no other indication that they were about to be struck by lightning. It can be said that things of this nature happen when least expected, particularly when you're not even briefed of the possibility.

There have been three other lightning strikes, in addition to this EA-6B incident (P-3, C-9, and F-4), all within a month's time, and all involved unbriefed thunderstorms in the vicinity. If you're the ones out there who think that CBs, and their accompanying lightning strikes, occur only in the summertime or when briefed, check with the crews of these aircraft. They'll *tell* you that Mother Nature can release her wrath any time of the year. These strikes all happened in January '79.

When flying into or near any unusual weather conditions/ predictions, doublecheck with the weathermen. Find out if there are conditions that could possibly get you "zapped" – then avoid that area if at all possible.

Departed and Recovered. The pilot of the F-4 had heard much about ACM departures and recoveries. Some were successful, others were not. It was soon going to be his time to find out firsthand what this "maneuver" really entailed, unintentionally. And, true to his profession, he did things properly.

During a scheduled "one versus many" ACM engagement, the *Phantom* pilot performed a 50-degree, nose-high, oblique pitchback into the pursuing bogey. As he pulled over the top inverted, the F-4 pilot selected one-half flaps. Altitude, airspeed, and angle-of-attack were 28,000 feet, 250 KIAS, and 20 units respectively. As the *Phantom* decelerated to flap speed, the pilot continued to pull into the bogey, holding approximately 20 units AOA. About 2 seconds later, the pilot began to feel the flaps lower. The aircraft *departed*, rolled, and yawed to the left at a moderate rate. The pilot immediately applied full forward stick, neutralized the ailerons and rudder, reduced power, and raised the flaps in an attempt to bring the F-4 back into controlled flight.

The aircraft continued its post-stall gyration to the left, with the nose oscillating 20 degrees about the horizon. After one turn, the cockpit indications

were AOA pegged at zero units, turn needle full right, and the airspeed at 140 KIAS. These indications were contrary to the aircrew's visual assessment of flight conditions, that the aircraft was upright and yawing to the left! At no time during the departure was the *Phantom* inverted or experiencing negative "G."

The pilot deployed the drag chute, which caused the nose to pitch immediately to the 20-degree nose-down position and the airspeed to build up through 230 KIAS. The pilot felt that he had control of the aircraft as it passed 23,000 feet, and by 17,000 feet he had fully *recovered*. Significant to note was the fact that even though the drag chute did not fully blossom (bogey verified), it still produced enough nosedown pitch to break the poststall gyration and allow the pilot to assess the situation. The chute remained with the F-4 until it was jettisoned at 350 KIAS.

The cause of this departure was surmised to be a slight asymmetrical extension of the flaps, combined with an excessive AOA and lateral control input. Items to watch for are any indications of asymmetry in flap or BLC (boundary layer control) operation (i.e., did the aircraft want to roll as the flaps came up on takeoff?). If so, the flaps *should not* be used during ACM, or at least transition should not be made at 20 units AOA. As long as ACM is flown, there will remain the risk of spin/departure. The professional manner in which this incident was handled is indicative of the thoroughness of the existing ACM training program in naval aviation.

Pro of the Month

WHILE aboard the USS LEXINGTON (CVT 16), AD2 Jerome Gallagher and AMS2 John Singer of Helicopter Support Squadron SIXTEEN (HC-16) were working on an H-46 when the refueling crew started to work. Shortly after refueling commenced, Petty Officer Gallagher smelled smoke, glanced into the cabin, and noticed flames coming from the aft transmission area! He called out to Petty Officer Singer, warning him of the potentially disastrous situation. PO Singer, who had been performing maintenance on the *Sea Knight* prior to the refueling operation, spontaneously grabbed a nearby fire bottle, ran to the aircraft, and extinguished the blaze.

By their alertness, attention to duty, and prompt actions, Petty Officers Gallagher and Singer handled this potentially explosive refueling situation in a most professional manner. They averted extensive damage to the helicopter and possible injury to surrounding personnel. These two men are highly commended for their actions and jointly deserve the title of *"Pro of the Month."*

Almost too hot

AN ATTACK pilot had a slight problem on a night takeoff, but as events unfolded it was nothing compared to what followed. After 100 feet of roll, he heard a whoosh/poof/pfft and saw a fuel boost caution light come on. He aborted at slow speed and announced what he was doing on Departure. He couldn't get an acknowledgement, so he switched to Tower.

He requested a right turnoff at the first available taxiway, asked to switch to base radio, and said he'd come back up on Ground frequency in a second. All requests were approved. He turned off the duty, switched to squadron common, and told the duty officer his problem. The duty officer told him to taxi to the line and he'd have troubleshooters meet the aircraft.

The pilot shifted back to Tower and made his presence known. (Later the tower log showed he'd been off about a minute.) While transmitting, he continued taxiing. As he switched back to Tower frequency, he came to an intersection, made a turn, and announced he was switching to Ground. At that time he thought he saw the throat into another taxiway coming up, and he slowed to make the turn.

The pilot saw a gap in the blue taxi lights and was sure there was concrete between them. He began a turn into the fuel pits, while changing to Ground frequency. Suddenly, he saw a small, wooden barricade right in front of him and he jumped on the binders. Unfortunately, he didn't stop soon enough and the starboard mainmount struck the centerline pit light, which severed a hydraulic line to the landing gear actuator unit.

The pilot was surprised to find himself in the fuel pits because he hadn't expected, or seen, any lighting in the area. He was also surprised to see smoke coming up the starboard side of the aircraft. It was vaporized hydraulic fluid being sprayed forward from the ruptured line. Within a few seconds, it caught fire! The fire extended from the starboard mainmount to the top of the canopy.

Although the canopy was closed, the pilot felt intense heat. *He wasn't wearing gloves and his sleeves were rolled up a couple of inches.* As he reached up to unfasten the upper Koch fittings, he realized his right hand was blistered and useless. He released his lap fittings with his left hand and jettisoned the canopy. He broadcast that he was on fire and getting out. He pulled the throttle off, threw down his mask, stood up to jump out, was restrained momentarily by the left lap fitting, and then jumped to the concrete. Ground personnel, luckily nearby, came quickly and put out the fire in 30 seconds with a PKP bottle.

Analysis of the tower tapes, and the pilot's recollections, revealed that during each of the three taxi turns he had to change frequencies. This diverted his attention. Even though he was at Homeplate, this was the first time he had taxied at night along this particular route. In addition to being confused or disoriented, the pilot did not use his taxi lights!

Someone once said, "Historically, pilots of tactical naval aircraft have avoided the use of taxi lights because the lights were not used for embarked operations or for landings; because their use implied a lack of skill, knowledge, or macho – or all three." Pilots who think this way are extremely foolish. If there weren't a good reason for spending the money to install taxi lights, AIRSYSCOM would have long ago saved the weight and money and had contractors build the birds without them.

If anyone doubts the reason for wearing gloves and keeping their sleeves full down from chock to chock, this story should convince them. The pilot couldn't use his right pinkies for anything for a long time. If you're right-handed, have you ever tried to unzip or knot a tie with your left hand? 'Taint easy.

The pilot's action in shutting down eased the fire-fighting problem and helped to save the aircraft, but the instantaneous response by two line personnel, at great risk to their own safety, kept the fire damage minor. Undoubtedly, a major conflagration was barely averted, and the pilot's life was probably saved by the unselfish actions of the line personnel.

BRAVO ZULU

Left to right: 1stLt Rik Iber, USMC, 1stLt Mark Steele, USMC.

1stLt Rik Iber, USMC
1stLt Mark Steele, USMC

THE flight of AV-8A *Harriers* departed MCAS Yuma for Cold Lake CAFB, Canada, in the fall of 1978. Less than 30 minutes after takeoff, things started to turn into worms for the team of 1stLts Rik Iber and Mark Steele of VMA-513. But this pair of young aviators acted as true professionals and proved that they could hack any combination of problems that would arise during this particular flight.

Approximately 150 miles out of Yuma, Lt Iber's *Harrier* experienced an a.c. electrical failure which rendered his aircraft without navaids. No particular problem, but attempts to reset his generator were unsuccessful and the aircraft became totally reliant upon d.c. battery power for communications and lowering of the landing gear. The decision to RTB (Yuma) was made, followed shortly thereafter by another emergency that compounded the first. The ailing *Harrier's* No. 1 hydraulic system (utility) failed completely, leaving Lt Iber without the use of flaps, speed brakes, pitch/yaw stab systems, and fuel flow proportioners. The only means to lower the gear was by the emergency pneumatic system, and the accumulator system pressure would also have to be used for nosewheel steering and wheel brakes on landing.

IstLt Iber was able to communicate his problems to his teammate, 1stLt Steele, who in turn effectively alerted LAX Center of the emergencies and the flight's intentions. LAX Center, in turn, notified MCAS Yuma of the difficulties and rerouted traffic, thus allowing the flight of *Harriers* a direct shot at a straight-in approach to Yuma. During the descent, Lts Iber and Steele utilized standard NATOPS HEFOE signals to communicate, thereby conserving the soon-to-be depleted batteries. Approaching final, the gear were lowered, followed shortly by a complete failure of the aircraft's main batteries. Lt Steele verified his wingman's gear down and had the tower instruct the crash crew to remove the crossdeck arresting gear cables for a conventional (no-hover) landing. The rest of the approach, landing, and rollout went according to the book.

Postmaintenance analysis discovered that faulty installation of a CSD magnetic chip detector plug caused the a.c. failure; a failed TRU (transformer rectifier unit) caused the d.c. failure; and a cracked weld on a hydraulic line to the flow proportioner caused the hydraulic failure.

Thanks to timely analysis, communications (normal and emergency), team professionalism demonstrated by Lts Iber and Steele, plus the timely and expeditious assistance of LAX Center and MCAS Yuma personnel, the harried *Harrier* remained in the inventory of live birds. Well done to all!

NATOPS was complied with in that minimum use of RCS (reaction control system) is recommended for PC 1 (utility) hydraulic failures to prevent possible inflight fires. The complete electrical failure (both a.c. and d.c.) could have been considered an overriding emergency, and an appropriate decision made for vertical landing due to resultant hot nosewheel steering. In this case, a game plan was set prior to the electrical failure and was carried out superbly instead of "changing horses in the middle of the stream." — Ed.

A recent incident involving a MK-46 torpedo load brought to light a potentially serious lack of knowledge on the part of aircrew and NAS crash crew personnel concerning the torpedo's fuel. MK-46 and MK-48 torpedoes contain Otto Fuel II, an extremely hazardous substance to humans which must be carefully dealt with. The following article is intended to give you an appreciation of the dangers of Otto Fuel II as well as some tips on handling leaks or spills of this toxic substance.

What you don't know CAN hurt you!

By CWO2 Fred Humphrey
Naval Safety Center

THE term "safe" can mean many things. For instance, Otto Fuel II is considered safe: it's nonexplosive, shock insensitive, and stable at temperatures up to 150°F for several years. These things are important in a torpedo fuel.

However, Otto Fuel is definitely not safe for humans. This amber-colored liquid is a very toxic compound. It can attack the body when you inhale its vapors, get it on your skin, or get small traces of it in your mouth. A minor dose can clog your sinuses and give you a headache. Further exposure can make it hard for you to breathe and alter your blood pressure.

Otto Fuel was introduced to the Fleet as a propellant for the Mark 46 torpedo in 1966. Now, it is also used with the Mark 48 torpedo.

The Navy Bureau of Medicine and Surgery has established a ceiling threshold limit value (TLV) of 0.2 parts per million (ppm) for Otto Fuel vapor exposure in a working environment. This means that personnel must not be exposed to Otto Fuel vapor concentrations in excess of 0.2 ppm.

Some people are more sensitive than others to Otto Fuel vapors. Vapor concentrations as low as 0.4 ppm can cause total nasal blockage in some people, which is usually the first sign of overexposure. The chief symptom of vapor inhalation or skin contact is a headache lasting several hours. Prolonged exposure can also cause nausea. Fresh air and black coffee may help ease these symptoms. Don't treat these effects lightly, though – the effects of long term exposure are unknown.

Direct ingestion of Otto Fuel is much more dangerous than simply breathing the vapors. That's why you should never eat or smoke in areas where the fuel is present. Ingestion can cause severe gastric disorders, and even **death.** If a fellow worker does ingest some Otto Fuel, or you suspect that he has, seek medical assistance immediately. If the victim is conscious, he should be made to vomit. It is possible that the victim may stop breathing. If this occurs, begin artificial respiration and continue until medical assistance arrives.

While it is nearly impossible to ignite Otto Fuel II in bulk at temperatures lower than 250°F, a finely dispersed spray can readily catch fire. When rags, paper, or fiberglass are present to act as a "wick," Otto Fuel can easily be ignited at room temperature. Once begun, the fire should be fought with water from a fog-type nozzle or with CO_2 extinguishers.

Safety Precautions:

- If you are working with Mark 46 and 48 torpedoes, you should know the general characteristics of Otto Fuel II and be familiar with the safety precautions for handling it.
- Immediately evacuate a compartment if more than one pint of the fuel is spilled.
- Wash any skin areas contaminated with Otto Fuel immediately with soap and lukewarm water. Do not wash with solvents, because they only speed the absorption of the fuel through the skin.
- If a spill occurs, remove and store contaminated clothing in airtight bags. Label the bags, and turn them in to an intermediate maintenance activity or other authorized disposal facility.
- Wear protective clothing and an approved breathing apparatus when involved in the cleanup of Otto Fuel spills. You should change protective clothing frequently enough to prevent absorbed Otto Fuel from contaminating underclothing and reaching the skin.
- Safety precautions should be posted in areas where Otto Fuel is handled.
- A Mark 15 Otto Fuel II Vapor Detector is used to alert personnel when dangerous concentrations of vapor are present.

Only personnel with the proper protective clothing and breathing apparatus should deal with leaks of Otto Fuel II.

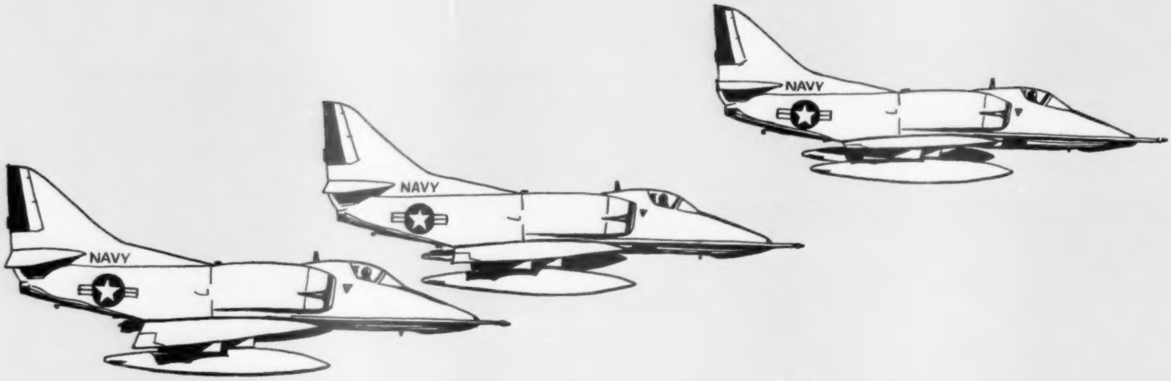
The best approach to clean the spills is to soak up the fuel with rags, if possible (be sure to wear protective clothing), or to use a portable pump to collect any fuel caught in pockets. There are two acceptable Otto Fuel cleaning agents: GSA clear liquid detergent (NSN 7930-00-985-6911) and GSA solvent-type detergent (NSN 7930-00-985-6946) or equivalent.

After cleanup, rinse the contaminated area thoroughly with water. Excessive use of solvents is not recommended. Complete and positive decontamination with a mixture called *NG Killer* is required only if welding or other hot work is to be done in the contaminated area. The *NG Killer* destroys any residual Otto Fuel; however, if you put it directly on a large quantity of the fuel, a brown, toxic vapor will be given off and the Otto Fuel may ignite. Due to this added hazard, protective air breathing equipment must be worn while working with the *NG Killer.*

Mark 46 and 48 torpedo stowage areas should be checked with the Mark 15 any time Otto Fuel II contamination is suspected. If vapor concentrations above 0.2 ppm are discovered, the area should be ventilated. Then, using the proper breathing gear, leaks or spills can be identified and corrected.

After cleanup, the space must be monitored once every hour for 4 hours to ensure the leaks have been secured.

There are two keys to cutting the risks of Otto Fuel II: A command-wide effort in spreading the word, and safety awareness at all levels. If you come into contact with Otto Fuel II, you should be aware of the exposure hazards, first aid procedures, and the protective equipment needed.



Keeping a reserve squadron safe

By LCDR Richard P. Shipman, USNR-R
VC-12 Aviation Safety Officer

IRREGULAR flying schedules, civilian job conflicts, decreased flying activity, and mission currency are just a few of the problems facing the air reserve pilot selected as a reserve squadron aviation safety officer. The safety problem is further complicated by the demanding missions the reserve squadrons undertake, such as day and night CARQUALs, air combat maneuvering, and extended weapons deployments.

To compensate for the accident potential of the reserve flying environment, the reserve safety officer must tailor his program to meet the unique needs of his squadron. His job is made more difficult right from the start by a lack of time available to carry out his program. The safety officer has usually no more than 1 day on a drill weekend to spend on safety since the rest of the time is taken up by flying, ground training, and AOMs. Even when the authorized 12 administrative drills per year are added, there are still only 24 days a year the reserve officer can spend implementing the safety program his active duty counterpart has the whole year to develop and execute.

With this limited number of days available to the reserve safety officer, the need is apparent for a safety representative who can be present when the reservist is not. To meet this need, an active duty (TAR) officer has been designated as the active duty safety officer. He provides valuable continuity and is available for immediate-action safety items. However, the reserve safety officer must bear in mind that the active duty officer is performing his safety duties as a collateral function added to the already staggering workload borne by the small cadre of reserve force squadron TARs. The active duty safety officer is an important person in the day-to-day working of the safety program, but ultimately it is the reserve safety officer who must bear the responsibility for making the safety program work.

With limited time to devote to the safety program, the reserve safety officer must direct his attention to the problems in the squadron that appear to pose the greatest accident potential. In our reserve squadron, these areas have been identified as follows:

- Mission currency of pilots
- Systems familiarity
- Excessive desire to fly
- Complacency/overconfidence

Mission currency is an area that requires constant attention. Our squadron flies a variety of missions, including TDU and banner tows, aerial refueling, low level navigation, and air combat maneuvering for the squadron's increasing role as adversary simulators. To ensure all pilots fly frequently enough to safely complete the assigned mission, Operations maintains a comprehensive status board that visibly displays pilots' last flight dates for a particular mission. Specific guidelines have been established within the squadron delineating the maximum time that can elapse before a dual refresher flight is required. Particularly close monitoring is given to ACM flights, since this is probably the most demanding flight evolution the squadron undertakes. If pilots have not flown an ACM hop within the preceding 10 days, they must have a refresher flight with a qualified instructor.

Systems familiarization is not as big a problem as mission currency, but it nevertheless is an important area that is easy to underemphasize in a reserve squadron. Since all the pilots are highly experienced, the tendency is to shortcut the systems lectures and other "basics" that are commonplace in a Fleet

squadron. In our squadron, however, a majority of the new pilots coming into the squadron have a fighter background and little A-4 experience. Although the A-4 is a relatively simple aircraft, the lack of a thorough understanding of the systems can be potentially catastrophic. To ensure a high level of systems knowledge, we have made full use of the OFT simulators. Every drill weekend has scheduled OFT slots, and pilots are cycled through the simulators at least once a quarter. AOM systems lectures, NATOPS quizzes, and monthly emergency procedures spot checks are also helpful. The squadron has had the most success with "scenario" discussions, where a problem is presented in the context of a flight situation, and the floor is opened to a discussion of "what would **you** do?"

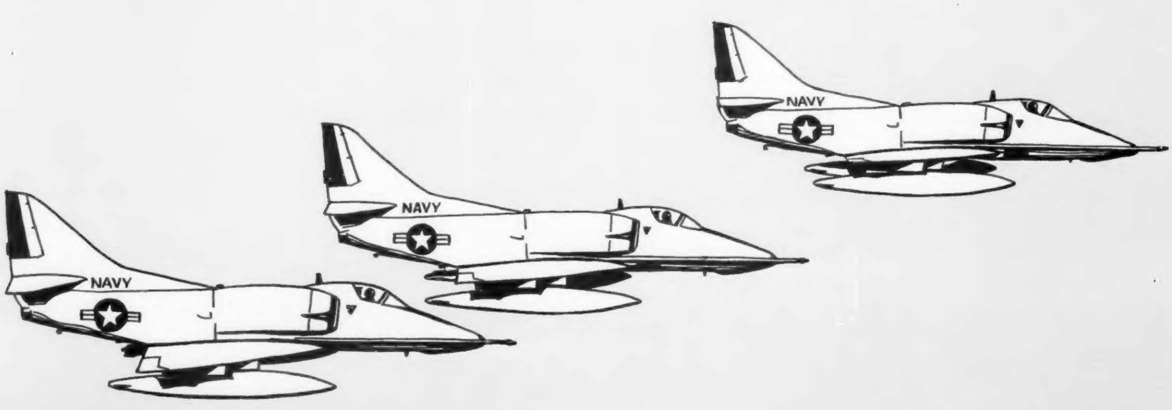
Another safety problem that is definitely unique to the reserves can be called "get-paid-itis." This is really only a variation of the old, familiar "get-home-itis" theme. In this case, however, the **excessive desire to fly**, even under questionable circumstances, can be traced to a force often stronger than home, family, and a familiar bed . . . money! The reserve pilot can log two drills (2 days pay) in 1 calendar day as long as he is on duty for at least 8 hours and he has at least one flight. If he doesn't get airborne, he can log only one administrative drill, regardless of how long he is on duty. Thus, the temptation to get "wheels in the well" can be very powerful.

In an effort to remove this temptation, VC-12 wrote a letter to the Chief of Naval Air Reserve suggesting that the definition of a flight drill be changed. If "intent for flight" (as defined in OPNAVINST 3750.6L) is used as the basis for logging a flight drill, the reservist would lose no money for a ground abort, thus removing the financial temptation to become airborne. Until this change is made (if ever), the squadron will continue to appeal to pilots' instinct for survival to overcome their mercenary tendencies.

The fourth area of major emphasis is the greatest safety problem in this squadron and probably in the naval air reserve as a whole – **complacency/overconfidence**. Complacency is undoubtedly the most tired and overused word in the safety business, but nowhere is it more applicable than in a reserve squadron. Every pilot in the squadron frequently encountered demanding situations during his active duty days and routinely mastered them. He tends to remember his accomplishments but tends to forget the level of proficiency he had at the time. It is very easy, for example, for a reservist to feel confident about launching and recovering in weather conditions right at OPNAV minimums since he did it countless numbers of times in the Fleet. What he probably doesn't think about as much as he should is that he may not have flown at all for 3 weeks, and he may not have flown in actual instrument conditions for 3 months. Not until he becomes airborne does he realize that he's not as good as he once was. Usually, his experience will bring him through safely, but if the situation is complicated by another factor such as an aircraft problem, the result might well be different.

Complacency is easy to identify, but hard to rectify. Ways to fight complacency have been the topic of many discussions among the department heads and the command. And discussion may well be one of the most effective ways to combat complacency; the subject is brought up routinely at AOMs and during safety discussions. Another good way to fight complacency is to point out the mistakes that have been made by other pilots in similar circumstances. Thus, the accidents and incidents of other reserve squadrons are reviewed in detail, because if it happened to them, it could happen to us. Similarly, our own incidents are reviewed in depth and discussed with candidness and full disclosure, even at the risk of occasional personal embarrassment. We don't delude ourselves into believing that we can eliminate complacency by these actions, but we hope that at least they will help.

In the final analysis, there are no gimmicks or magic techniques that make a squadron safe. Sound airmanship and good maintenance are the backbone of a safety program and the prerequisites for accident-free flight. Fortunately, these are the areas where the naval reserve excels. With this foundation of experienced, capable airmen and knowledgeable, motivated maintenancemen, the job of the safety officer can be directed toward attacking the problems unique to the reserve aviator. The approach the reserve safety officer takes to his safety program is probably going to be different than the approach taken by his active duty counterpart, but the safety record of the naval air reserve indicates that it's a good approach.



LAMPS Safety aboard the USS McCandless

By LCDR George Galdorisi
HSL-32

LAMPS safety aboard the USS McCANDLESS has been an evolutionary process during the 16 months that the officers and men of McCANDLESS and HSL-32 Det Seven have been part of a LAMPS/frigate team. A process that started as a cautious first-week workup over a year ago has culminated, 16 months later, in a record of over 500 accident- and incident-free hours and 800 accident-free deck landings. The *secret* to this success is no secret, merely a well reasoned approach to one of the most demanding challenges in naval aviation.

McCANDLESS' LAMPS/frigate team began their association with extensive operational and safety briefs. McCANDLESS' flight deck was overhauled and dozens of rusted out padeyes replaced with new, corrosion-resistant ones. Damage control and firefighting equipment were provided in quantities greater than those required by existing directives, and extensive steps were taken to ensure that all gear could be secured in order not to present a FOD hazard during flight quarters.

Ship's personnel, particularly fire party members, were briefed extensively on LAMPS operations. Ship's OODs were introduced to all facets of LAMPS operations, particularly wind envelopes and emergency procedures. Furthermore, a number of department heads and OODs received familiarization flights in the LAMPS Weapons System Trainer before deployment, in order to experience firsthand the uniqueness of landing a helicopter on a pitching and rolling flight deck. Surface warfare officer comments such as "No wonder you need specific winds to land" and "So that's why it's critical to have the GSI [glide slope indicator] up" signalled the start of a relationship of mutual respect and cooperation.

The first-week workup, under the close scrutiny of a COMHELSEACONWING ONE safety observer, offered the LAMPS/frigate team their first opportunity to conduct flight evolutions, particularly day/night landings, ASAC work, helo movements, and other unique LAMPS evolutions. The safety observer's comment that "Coordination between ship's company and det personnel has been excellent; both det and ship personnel have exhibited a firm grasp of the fundamentals required for safe and effective utilization of the LAMPS weapons system" indicated the beginning of an outstanding team effort.

McCANDLESS' refresher training provided the LAMPS/frigate team with the opportunity to conduct extensive underway operations and to have these evolutions evaluated by the Fleet Training Group on a daily basis. All evolutions from mundane items such as helo bill completeness and the proper operation of flight deck equipment to demanding evolutions such as crash-on-deck drills, HIFRs, and day and night deck landings were evaluated by Fleet Training Group.

McCANDLESS' successful completion of all LAMPS standard training requirements in the first 4 weeks of a 2-month refresher training cruise signalled the rapid maturing of the LAMPS/frigate team.

The next challenge to the McCANDLESS LAMPS/ frigate team was an ocean training exercise. Though the primary mission of the exercise was the practice of ASW and ASST (anti-ship surveillance targeting), this short trip found the team involved in many LAMPS secondary missions. During the course of less than 1 month, McCANDLESS' LAMPS helo conducted six medical evacuations of shipboard personnel. Some of these evolutions required middle-of-the-night flight quarters and tracking of the helo over long ocean distances by the ship's ASACs (Antisubmarine air controllers). Two weeks after returning from refresher training, the McCANDLESS LAMPS/frigate team participated in one of the most demanding evolutions possible for a LAMPS ship. A COMHELSEACONWING ONE deck landing qualification period was conducted. For 5 days, the team conducted day/night landings with aircraft from four different squadrons. The ship's ASACs sharpened their skills by simultaneously handling numerous inbound, outbound, holding, and pattern helos in often marginal weather conditions. McCANDLESS' HCOs (helicopter control officers) gained invaluable experience in handling up to three aircraft in the landing pattern, allowing wing pilots to obtain the maximum number of deck landings while ensuring safe flight deck procedures.

McCANDLESS' LAMPS/frigate team began its recently completed, highly successful deployment with over 200 flight-hours, 200 deck landings, and 10 months of teamwork behind them. The extensive training and teamwork paid off handsomely, not only in enabling the team to compile impressive cruise statistics (450 flight-hours and over 500 deck landings), but also in enabling the team to operate as a superbly efficient air asset and air capable platform. The team performed expertly in its primary mission areas of ASW and ASST and provided added flexibility by performing such varied missions as torpedo transfer, medical evacuation, HIFR to all force helos, VERTREP and passenger transfer with all types of Navy and Marine helos, and a plethora of other missions. The McCANDLESS LAMPS/frigate team's ability to maintain a flawless record of accident- and incident-free operations, in spite of an extremely high tempo with unusually varied ops, is a testimony to the fact that an aggressive safety program pursued vigorously over the course of many months can make LAMPS ops safe, effective, and efficient. The ultimate product, a small combatant with greatly enhanced offensive and defensive capabilities, is well worth the time and effort devoted to attaining that elusive goal of LAMPS safety.

Wind shear warnings aloft

ENGINEERS and meteorologists in the Surveillance Systems Branch of NAFEC's (National Aviation Facilities Experimental Center) Systems Test and Evaluation Division are working on the development of a higher altitude, wind shear warning system to complement the Center-developed, Low-Level Wind Shear Alert System already in operation at several major terminals.

The LLWSAS is proving very effective in the detection and warning of wind shear conditions at airports from ground level to perhaps 60 feet above ground level. While considered to be an advance in the field, it still leaves some major gaps in coverage, particularly at higher altitudes.

A recent report from the Southern Region tells of a Boeing 727 encountering severe wind shear at 1200 feet above ground level while on approach to Hartsfield International Airport in Atlanta. The plane dropped to 300 feet above ground level before the pilot was able to stop the sink rate, despite the immediate application of full power. All three engines exceeded their temperature limits and had to be replaced.

To prevent incidents such as this, or worse, the Surveillance Systems Branch has undertaken the development of an upper air, wind shear detection system based on an airport surveillance radar, under program manager Ronald S. Bassford. Others involved are project manager Dominick L. Offi, project meteorologist William Lewis, project engineer Tai Y. Lee, and project technician Alfred DeLaMarche.

Using a wind shear measuring system developed under an FAA contract by the National Oceanic and Atmospheric Administration's Wave Propagation Laboratory, Offi set up a wind shear radar test facility at the Terminal Facility for Automated System Testing.

This facility or test bed consists of an ASR-8 airport surveillance radar and the Wave Propagation Laboratory's wind shear measuring system. This WPL system consists basically of a 15-foot parabolic antenna on a rotating pedestal and associated computer system. The parabolic antenna takes its power from one of the ASR-8 dual channels, while the ASR-8 continues to function as an air traffic control surveillance radar on its other channel.

The wind shear measurement system was designed specifically to work with the pulsed doppler or coherent radar techniques used in the newer ASR-8 and upcoming ASR-9 terminal surveillance radars. The WPL parabolic antenna is designed to concentrate the energy from the surveillance radar into a narrower, more sensitive beam that can pick up the relative movements of clear air parcels having different densities due to varying moisture content, as well as precipitation particle movements.

WPL also provided the interface board, to tie the system into an NAFEC minicomputer, and the computer program for processing the radar returns. The computer extracts the doppler information from the radar signal returns and calculates the wind speed at different altitudes that have been preselected along the glide slope. For example, the beam from the parabolic wind shear antenna could pick up a wind speed of 5 knots headed at the antenna at 200 feet and a wind speed of 9 knots at 400 feet headed away from the antenna. This, in effect, would serve as a warning to the pilot that he is going to encounter a 14-knot wind shear between 200 and 400 feet.

The Surveillance Systems Branch started feasibility testing of the wind shear warning system in April 1978, using the parabolic antenna on a fixed pedestal. This preliminary test program continued until February 1979. The results were very promising, says Offi, and showed that it was definitely possible to measure wind speeds along the fixed path of the parabolic antenna radar beam. These results were correlated with those made aboard an instrumented University of Wyoming aircraft.

In February 1979, the group obtained a rotating pedestal for the parabolic antenna that enabled them to point the antenna in any direction and at any angle for the investigation of scanning techniques. The purpose of this phase of the program, which ran through December 1979, was to determine if the system would work at airports where the primary and secondary radars were offset from the runways and glide slopes.

Again, Offi says, the preliminary analysis of these tests appears highly promising. The radar wind shear detection system can pick up wind shears at any altitude along the length of the glide slope path regardless of where the radar is located in relation to the glide slope.

The final phase of the program, which is just now getting underway, involves the optimization of the system for field use. One of the primary tasks in this phase of the program, which is being directed by Lewis, involves the development of a suitable display for the terminal control tower and an evaluation of the display candidates by working air traffic controllers.

During this final phase of the program, the group will also use the radar wind shear warning system to investigate thunderstorms. The idea behind this, according to Lewis, is to determine if the system can pick up the gusts generated by thunderstorms to provide even earlier warnings of wind shear situations in the making.

The group expects to finish the program early next year and pass its final report and data package on to Systems Research and Development Service, the program's sponsor. The decision on implementing the system at operational airports will then be made by headquarters in Washington.

Reprinted from NAFEC *News Highlights*

The emergency deployment syndrome

The all Navy/Marine major accident rate for March 1980 was .59. This indicates a further reduction from the peak experienced in December 1979. —Ed.

By Robert A. Alkov, Ph. D.
Aeromedical Division
Naval Safety Center

A HELO, loaded with emergency supplies and medical personnel, crashes on an errand of mercy following a natural disaster, killing several crewmembers and passengers. An attack aircraft is launched from an aircraft carrier deployed to show the flag during an international crisis. The pilot, an experienced aviator, apparently flies into the water with no witnesses and no survivors. An aircraft on the way to a rendezvous with an aircraft carrier diverts to check out a Soviet trawler. After making a pass over the foreign vessel, the aircraft pulls up, stalls, and hits the water with no ejection attempt. What do all of these pilot-factor accidents have in common? They were possibly all victims of the **emergency deployment syndrome.**

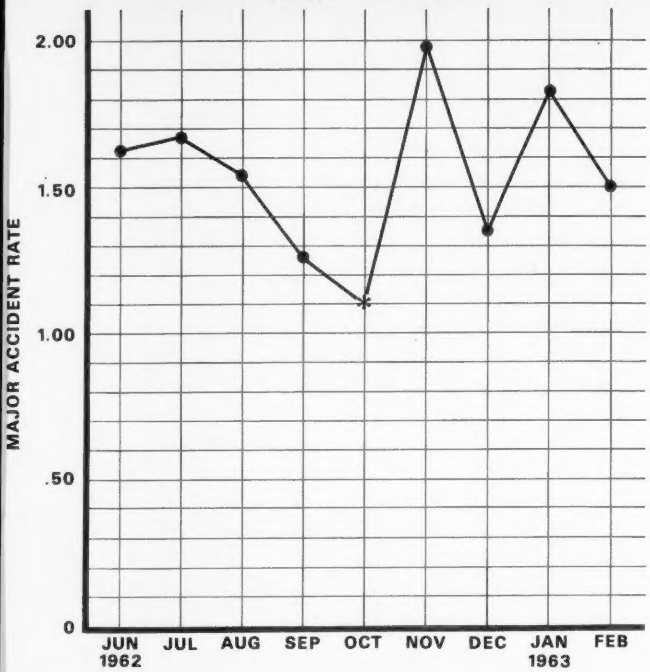
Naval aviation has been characterized as "hours and hours of boredom, interspersed with a few moments of stark terror." Well, it may not be all boredom, and some of us may never experience stark terror, but when the routine is disrupted by a chance to put into practice all those hours and hours of training, something happens to cause us to throw caution to the wind. The image of the hero of an old World War II movie running out to his P-40 (which his crew chief has ready and turning for him) to intercept incoming Japanese bombers comes to mind. Much as the old western hero who leaps on his horse and rides away in a cloud of dust, our hero jumps into his aircraft (sans preflight), pours on the coal, and leaps into the wild blue. When the "balloon goes up," the tendency is to throw out the rulebook, kick the tires, and light the fires. This phenomenon is supported by the observation of an increase in the major accident rate as the U.S. became more and more committed to the war in Southeast Asia. The All Navy/Marine major accident rate rose from 1.25 in 1965 to 1.41 by 1968. Also, during World War II, more aircraft were lost to accidents than to enemy action.

The Cuban Missile Crisis of October 1962 provides the most similar scenario with which to compare the current Iranian/Afghanistan situation. Both events required the rapid deployment of large numbers of ships, aircraft, and personnel. Also, both situations came about suddenly and were fraught with the threat of global warfare, thus increasing the stress of personnel directly involved. Figures 1 and 2 illustrate the comparison of how both of these international crises affected the all Navy/Marine major aircraft accident rates during the periods immediately following the crises. As can be seen, a significant increase in the accident rate immediately followed the beginning of each crisis.

The exhilaration felt due to the disruption of the routine and the possibility of seeing action trap the unwary into taking unnecessary risks. When the adrenalin starts flowing, there is a tendency to bypass established NATOPS procedures. The *can-do spirit* of our aircrews leads to foolish risks, unnecessary for the completion of assigned tasks. For

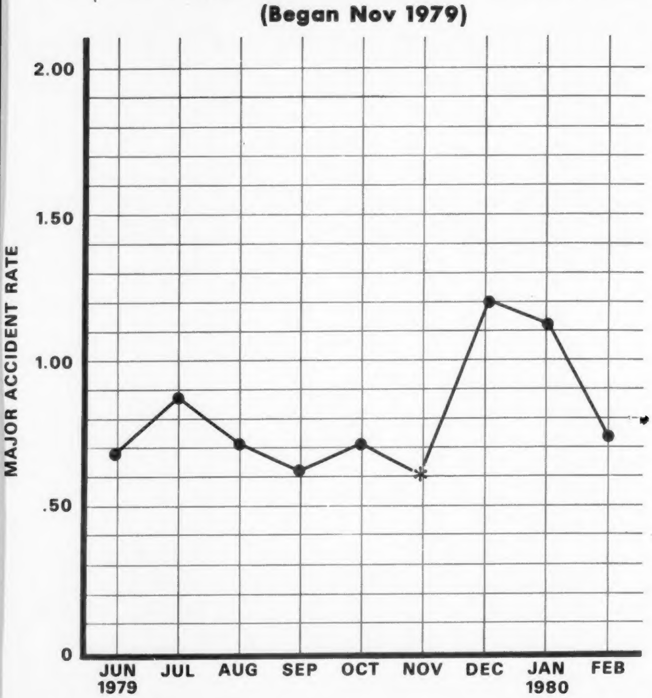
Cuban Missile Crisis

(Began Oct 1962)



Iranian/Afghanistan Situation

(Began Nov 1979)



example, it was later discovered that the crew of the above-mentioned helo had no meals in the 20-hour period preceding the mishap. Rations were available, but the pilots felt so rushed to alleviate a deteriorating emergency situation within the local area to which they had been deployed that they didn't take time for food! This led to a physiological state of hypoglycemia (low blood sugar). Hypoglycemia may cause errors in judgment, *fuzzy* thinking, and irritability. All of these factors were present in the mishap aircrew in question. Errors in navigation, headwinds, and a sense of urgency to get to the destination were soon complicated by a low fuel situation. A hurried attempt at an emergency landing ended in disaster.

Recent hostile actions in the Middle East threatening world peace have resulted in emergency deployments. The necessity for immediate response has led to disruptions of schedules, extensions of at-sea periods, and cancellations of plans for holiday seasons. The crisis environment under which operations were performed placed additional stress on personnel who were already coping with stresses brought about by low manning levels, lack of experienced personnel, and uncertainty concerning the future (including inflation, pay restrictions, and a perceived dilution of benefits). Adding to these stresses was the necessity for blue water ops, limited in-port time, and lack of bingo fields.

This is not to imply that the personnel involved did not welcome the opportunity to be of service to their country. The *can-do spirit* provokes attempts at trying to accomplish more and more with less and less. Excessive zeal and motivation, however, must not exceed the bounds of common sense. A well rested and nourished crew should be able to cope with the above-mentioned stressors while carrying out their missions safely and efficiently.

The sudden change from a peacetime training cruise to combat alert time was initially very satisfying to crews who, although disappointed in not being able to carry out their holiday leave plans and to see their loved ones, were eager to show their stuff when called upon. However, as the days dragged into weeks with no action, there was a general letdown of enthusiasm with the passing of a sustained performance peak, all of which led to the onset of fatigue and boredom. This can result in greater risk-taking behavior, especially so when the frustrations of seemingly having made a meaningless sacrifice settle in.

The increase in the number of mishaps since November, when the crisis in the Middle East began, may not be explained by this phenomena, but it is possible that some portion is related. These frustrations are being experienced by the general populace and can't help but be a factor for those involved in a more direct, professional way.

It is apparent that these frustrations are going to continue during the foreseeable future. Supervisors at all levels of command should: a) be aware of this syndrome; b) brief their people to recognize it; c) schedule missions carefully in order to avoid excess stress and fatigue; and d) continue to emphasize the importance of NATOPS to all aircrews. ◄

WHICH WAY IS DOWN?

WHICH WAY IS DOWN?

By CDR V. M. Voge, MC
Naval Safety Center

THIS is the third in a series of APPROACH articles discussing the various forms of vertigo and spatial disorientation. Hopefully, you've read the first two installments. If not, it would be a good idea to lay your hands on them and get some basic background information. If you can't read the other articles just now (someone has carefully "filed" them away), read on, but make a mental note to read the others. Your personal well-being may depend on it.

As we promised last month, we're now going to discuss somatogravic illusions.

Somatogravic illusions are those in which we perceive that our aircraft is in an attitude which actually is the resultant of various force vectors that may be in a direction and/or of a magnitude different from the normal gravitational force. Sound confusing? We'll try to clear it up for you. This illusion has already killed too many naval aviators, and there is no guarantee that its effect will not strike another unsuspecting crew in the near future. No need to get an anxiety attack! This one is **not** dangerous, **if** you are aware of its insidious nature, and take corrective actions. Interested? You should be!

We normally consider gravity as a "stable" point of reference – something we can usually depend on. We're quite used to it, and we accept it for what we think it is. We regard it as a vertical force (at least, most of us do). As you may or may not remember from your basic physics classes, gravity is actually a force of acceleration perpendicular to the earth's surface. This is essentially the same physical principle we experience when we have a linear or a translational acceleration (remember drag-racing at stoplights?) Usually, the linear acceleration curves are short-lived – e.g. you have to stop at the next stoplight, there are bumps in the road, or even your childhood swing only goes so far. When this is the case, our "infallible" brain can separate these added acceleration forces for what they are, and there is no problem.

The problems come when we have prolonged acceleration curves, or profiles – as when we take off in our trusty aircraft – **especially** so on catapult shots, at night, or in severe IMC (no visual reference). These profiles are usually obtained through an increase in thrust or a decrease in drag. Our *Mode X-1-A acceleration input separating mechanism* in our brain gets short-circuited, and the various acceleration inputs are combined. The result is our *new* vertical point of reference (our *force of gravity*). This is another reason why *seat of the pants* flying is so dangerous to the unwary.

Even our basic maneuvers texts way back in preflight gave us a hint of this illusion when they talked about load forces on the aircraft and load factors in coordinated and uncoordinated turns. In a prolonged coordinated turn, we feel as if we're not even turning. Because the gravitational force equals the centrifugal force, we have a net force change of zero. In a prolonged uncoordinated turn, the centrifugal force usually exceeds the gravitational force, and we slide to the outside of the turn (or the inside, depending whether we're in a slip or a skid, a banked or a flat turn). Got the drift? (No pun intended.) If the turn is prolonged, our brain takes the

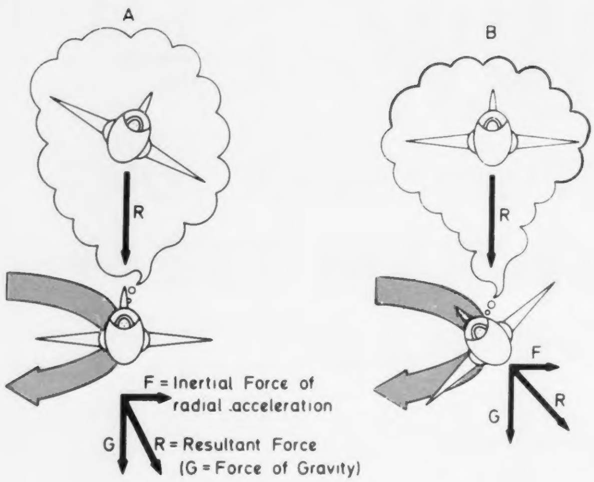


Fig. 1 — False perception of attitude — the somatogravic illusion — in a turn. The aviator equates the sustained resultant (R) with the vertical. Hence, in a flat turn (A) he may feel as if he were being rolled out of the turn. In a coordinated turn (B) the resultant is aligned with his Z axis and he has no sensation of being in a banked attitude.

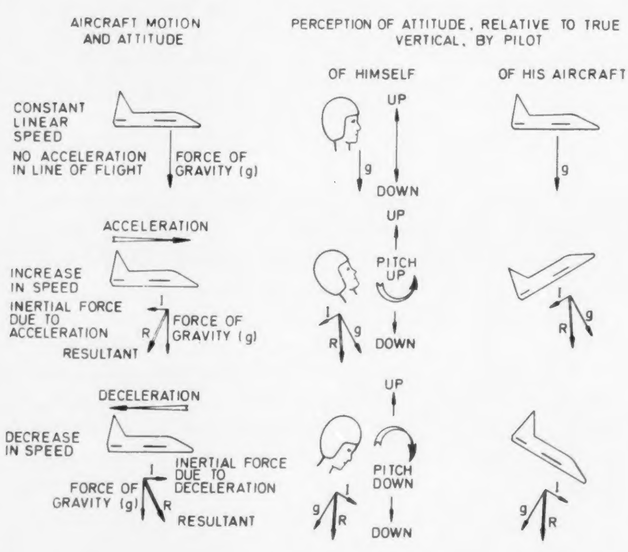


Fig. 2 — Somatogravic illusions during linear acceleration or deceleration in the line of flight give errors in the perception of pitch attitude.

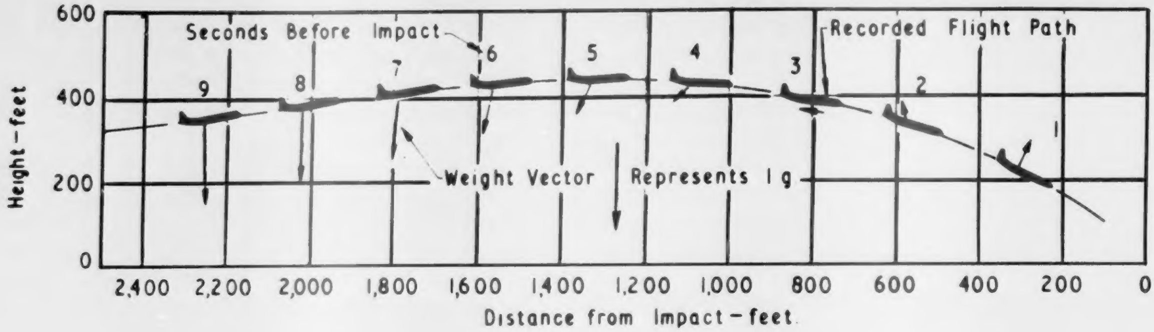
resultant force vector of the gravitational force and the centrifugal force and gives us a *new* vertical (see Fig. 1).

The changes in perceived vertical are not nearly as dangerous in the roll mode as in the pitch mode, especially in low-level flying.

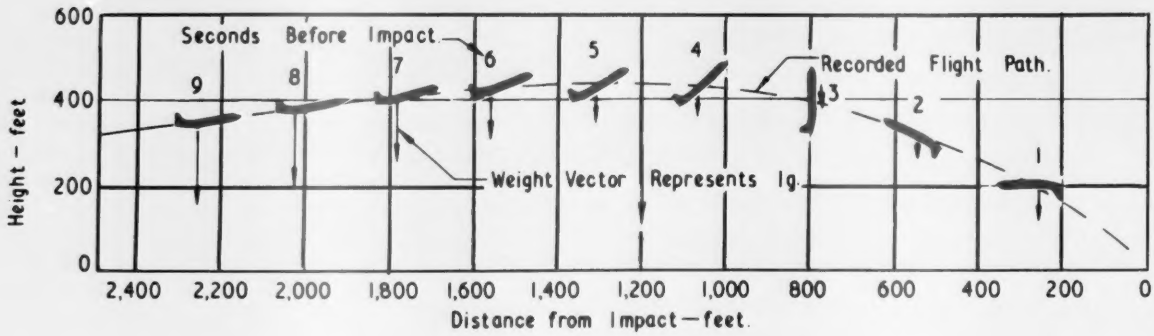
In normal straight-and-level flying, without accelerative or decelerative forces, the force of gravity is the predominate force and we have no problem. Our trusty "glutimus maximus" (pant's seat, for the uninitiated) faithfully tells us where *mother earth* is located. During a prolonged acceleration, by increasing our power setting or by reducing drag, a force is pushing us back into our seats, and we feel as if we are pitching up. The resultant force is aft and down (our new vertical), as in Fig. 2. The opposite occurs if we decelerate, by reducing power or increasing drag. (Have you ever double-checked your altimeter or VSI, after putting out the spoilers, to make sure you weren't losing altitude, or pulled the stick back to maintain altitude only to find yourself climbing?)

For those of you who like a definite mathematical equation to tell you just how affected you will be and when — forget it! Just how affected each of us becomes varies with each of us as individuals, how we feel on that particular day, and to make matters worse, it may take up to a minute for the illusion to be fully established. Figures 1 and 2 are just gross estimations. A catapult launch, which usually gives us about a 5G (50 meter/second^2) peak for 2-3 seconds, can also give us an erroneous sensation of a noseup attitude for more than a minute! This was the primary cause of our loss of many naval aircraft several years ago after catapult launches on dark nights. The planes would essentially fly into the water shortly after a completely normal launch. Since the cause of these "unexplained" mishaps was ascertained, general instructions for climbout after such a launch were modified. We have lost very few planes since. However, we are still losing aircraft simply because the pilot in control doesn't look at and believe his instruments! But, these illusions affect not only our high performance jocks. As little as 0.2G, if sustained for several minutes, can make even you helo and patrol types feel as if you're climbing, or at least in level flight, when in reality you could be losing altitude rapidly. This could be bad news for you on a low-level mission, or a dark night, or in severe IMC conditions.

Sound bad? It can be worse! If you experience the somatogravic illusion on takeoff or when you're worried about overshooting an approach (again, especially so at night or under poor visibility conditions), you may feel as if you're climbing or in a pitch-up attitude. Response? Push the stick forward, of course! No time to check altitude — too low! Get the picture? Things are usually worse if we decide to decelerate or accelerate during a banked turn. We now have two added accelerative forces, instead of the already-dangerous one. The resultant force vector gives the *seat of the pants* pilot a perceived vertical that is even farther from the truth. We make what we feel to be a corrective response, but the noseup attitude seems to become more severe, rather than becoming less. We're tempted to push the stick a little further forward.



Recorded Attitude and Flight Path



Illusory Attitude

Fig. 3 — Recorded flight path and calculated force (weight) vector of an aircraft which crashed after initiating an overshoot. The initial change in the direction of the force vector was caused by acceleration in the line of flight. Later, the curved flight path introduced a radial acceleration and was responsible for large changes in the direction and magnitude of the force vector. Over the relatively short time scale in which changes in the force environment occurred, it is unlikely that the illusory perception of attitude was as erroneous as indicated in the lower half of the figure, but illusions of the form shown have been reported during comparable bunt maneuvers.

This increases the tightness of the bunt maneuver, with further rotation of the force vector. We may even be exposed to negative G. Confused on the outcome? Well, those pilots who have been lucky and high enough to be able to recover from their illusion have reported that they felt as if the aircraft had pitched up and flipped over on its back (see Fig. 3)! Recovery was finally made with the plane actually in a near-*vertical* dive, several thousand feet lower than when everything started!

As usual, we will tell you how to prevent making yourself a statistic in our computer once you suffer this illusion. Scan your instruments repeatedly. Do not rely on what you *feel* to be your orientation or attitude. Doublecheck your instruments and **believe** the instruments! There's *always* time enough to save your skin, if you only choose to do so.

Next month, we'll continue along this same vein. We'll discuss somatogyral, oculogyral, oculogravic, oculoagravic, and elevator illusions, the last of which are VFR manifestations of the somatogravic illusion. Not only do your semicircular canals and pressure receptors (seat pants) lie to you, but even your eyes will do it! See you next month!

Think About It!

Actual discrepancy on the yellow sheet:
"Lost No. 3 engine after 3.7 hours of flight."
Actual crew chief's writeoff for above discrepancy:
"Found No. 3 engine on wing after 30 seconds of search."

1979 CNO SAFETY AWARD WINNERS

CNO "Readiness Through Safety" Award

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VA-65
VP-11
VS-28
VAW-121
HS-15
VR-24
VF-43
HSL-34
HM-16
*HC-6

NAVAIRRESFOR

VF-301
*VA-305
VP-69
VR-55
HS-74
VC-13

CNATRA

*HT-8
VT-4
VT-21
VT-31
**VT-10

NAVAIRPAC

VF-51
VA-93
*VA-115
VAQ-131
VS-33
VRC-30
VAW-114
VP-48
HS-12
*HSL-35
VA-128
*VX-5

FMFLANT

HMM-261
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VMFA-312
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FMFPAC

VMFA-212
*VMFA-531
*HMM-265
HMH-463
VMGR-152

*Second consecutive year
**Third consecutive year

Admiral James H. Flatley Awards

Group I USS Dwight D. EISENHOWER
Group II USS TARAWA
Special USS LEXINGTON

Saturday night and no bingo!

By LT Tom Kilcline
VF-51

IT'S Saturday night and the club is hundreds of miles away. Tonight, bingo is out of the question! When I launch in an hour, I will have only this ship to return to. The brief for this mission was much simpler. The section of the brief reserved for divert field information and weather said only "blue water operations." Considering the AOM centurian qualification I received during our Transpac, I am well prepared for "blue water operations."

The squadron plan for "blue water ops" consisted of AOMs directed at exactly what I am about to face tonight. Broken down into five topics they were:

- Emergencies during "blue water operations."
- Fuel management and conservation techniques.
- Aircraft/ship engagements.
- Barricade engagements.
- Survival equipment and water survival techniques.

Before addressing each specific topic, I feel it is best to remember the overall considerations for any operation conducted under "blue water" conditions. These can be broken down into three major factors: *environmental, aircrew capacity,* and *aircraft status.* Though these will affect any flight, the criteria for a launch/abort changes with the hard fact that the only place to land is on a very large ship that is a very small airport. *Environmental factors* consist of weather, day/night, the status of the ship's radios, *navaids*, deck motion, wind over the deck, and arresting gear limitations. *Aircrew capacity* consists of health, mental alertness, proficiency, experience and knowledge of the type aircraft, and when to apply certain procedures. *Aircraft status* is the condition of its communications equipment, navaids, accuracy of the instruments, lighting, and minor discrepancies.

Now, before I even climb into my trusty aircraft, I can analyze the above conditions on any particular night and make a decision on launching. It's a go for tonight, but to completely prepare myself, I'll review the possible ship/aircraft emergencies that can cause problems while airborne. Those that would prevent a safe carrier landing attempt or result in a barricade situation are landing gear, arresting hook, wing sweep, and flap malfunctions. The first step in all the above problems is to fly my aircraft and follow NATOPS emergency procedures. Next is to communicate my situation to the ship so that required coordination for recovery order, wind over the deck, arresting gear, and possible barricade engagement can be arranged. As a field landing is out of the question, I am forced to use a barricade in most instances of landing gear malfunction and even eject in one case. Therefore, prior planning with my RIO in dealing with unsafe or hung gear is in order. The main thing is to get an all-down-and-locked indication. With an unsafe-up but safe-down indication, the gear should be left down to preclude possible jamming of gear doors and aggravating my situation with one mount caught up. The arresting hook is a very simple

system on all aircraft, yet my only means of stopping is an arrested landing. A small item like a hook safety pin can put me into the barricade. Another item of interest is the (pneumatic) dashpot pressure, which can cause the hook to skip the wires all night long without the proper servicing. I ensure a functional check prior to launch since the barricade is again my only other option.

A problem peculiar to the *Tomcat* is wing sweep emergencies. With the wings aft of 40 degrees, arrestments are not authorized and barricade engagements are not allowed when wing sweep is greater than 35 degrees. Another concern in this case is wind over the deck and gross weight. With the wings back at 25 degrees, the engaging speed is approximately 8 knots faster, and at 35 degrees, it's 18 knots faster. When this is combined with any hung ordnance or trapped fuel, the approach speed can easily exceed the max arresting gear limitations. This is where the wind over the deck comes into play. For example, at 3000 pounds of fuel, 1000 pounds of hung ordnance, and the wings stuck at 40 degrees, the ship needs 28 knots of wind over the deck. That may be simple enough, but if I am unable to lower my flaps, the ship will now need 48 knots of wind over the deck to recover my crippled bird. The F-4J accident from the 27 May '79 *Weekly Summary* dramatically illustrates this point. The aircraft was unable to slow to an acceptable approach speed due to a utility hydraulic failure and no flaps. Without a bingo divert field and required wind over the deck for a barricade, the crew was forced to eject. In the F-14, the flap system can cause unusual control problems and therefore, necessitate higher approach speeds. Without the main flaps lowered, the *Tomcat* is not authorized to take the barricade. It's obvious at this point that a thorough knowledge of the entire flap system is imperative.

Other emergencies, which do not in themselves prevent arrestment, are: single-engine arrestment, hydraulic failure, inoperative spoilers, and various instrumentation failures. The one and four wire must be pulled for a launch bar failure, and a higher incidence of bolters should be expected. With a single engine, I will lose a significant amount of performance both on the ball and on a bolter. A straight-in approach is prudent. The loss of a hydraulic system may cause the loss of landing aids and stability systems which can drastically change the aircraft approach characteristics. An inoperative spoiler can change my approach speeds and cause control difficulties. All these emergencies should concern the pilot during any approach, but particularly so during "blue water" conditions.

The use of emergency periods during FCLP, coupled with valuable OFT time, will pay dividends. The key is proficiency and preparedness.

Now that I've thoroughly reviewed the implications these emergencies can cause in "blue water" conditions, I turn my attention to fuel considerations. The F-14 is an incredible fighter in its ability to exceed Mach 2.0 yet endure for a double cycle. Still, there are considerations to remember when max conserve is the call. "Blue water" and a down tanker is not an optimum combination, so a few techniques on fuel conservation are a must. I will check my trim as close to neutral as possible and check that maneuvering devices are in the optimum position in order to reduce as much drag as possible. If I avoid abrupt control movements and turns greater than 15 degrees AOB, I will not lose much lift. The trick is to set a fuel flow that will optimize lift and minimize drag. By referring to the NATOPS Flight Manual, I am able to check the best altitude and airspeed to achieve this combination. The maximum endurance altitude for a 60,000-pound *Tomcat* is 27,400 feet, and for a 45,000-pound *Tomcat*, it is 31,800 feet. As fuel load goes down, I should climb and fly the optimum Mach number or true airspeed for my gross weight. This is more accurate than a fuel flow setting. The best average Mach number for climb is .67, and for descent, the best speed is 195 KIAS.

I have covered the critical emergencies and optimum endurance fuel figures. Navigation in a "blue water" situation can be just as important and difficult. It is paramount to know where the ship is at all times. An up TACAN station and UHF homer for the CV and accompanying ships is the best case. Yet, the inevitable EMCON condition or TACAN failure must be backed up with a constant dead reckoning plot. Also, the employment of airborne radar to plot the ship's position utilizing the briefed task force layout is extremely helpful. Inertial navigation systems are very important, and an up INS should be a prerequisite for flight under "blue water" conditions, particularly at night or under IFR. The best guide is not to accept a degraded system and thoroughly brief the nearest field, regardless of distance, in case of a major CV casualty. The bearing and distance to the nearest land may be the only comfort I have on a dark night!

The barricade is the least desirable method for landing aboard, yet it may be the only one. The barricade is located between the No. 3 and 4 wires, and the stanchions stand 24 feet tall. The actions I must take prior to engaging the barricade include the jettisoning of all external stores possible. I want to reduce my gross weight as much as possible (dump fuel) to decrease my approach speed. The maximum closure on the barricade is much slower than on a crossdeck pendant. My exact gross weight should be computed and transmitted to the ship. The glide slope will be steeper than normal and the target wire will be No. 1 vice No. 3. The important thing is to fly a centered ball because of the smaller hook-to-ramp clearance, higher winds over the deck, larger burble, and many other distractions. I should never take my own waveoff. The barricade is 20 feet tall at the center, and misjudging it could prove disastrous. In-close, the ball will disappear behind the port stanchion. I'll need to hold what I have and respond to the LSO's calls. Two important things for me to remember are: correct lineup, because the retraction motor leaves no capability to correct offcenter hits; and go to idle on touchdown because I can't bolter out of the barricade.

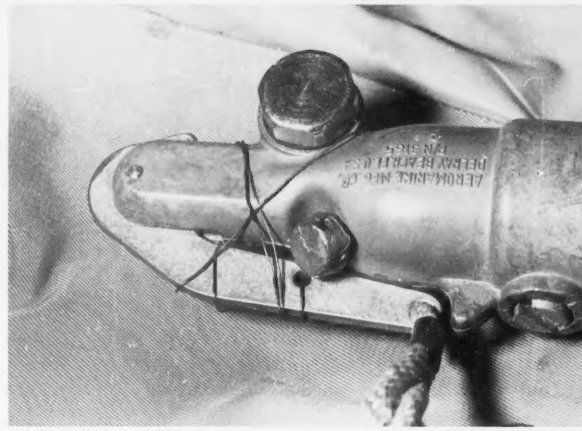
The last point I'll cover on blue water operations is survival equipment and techniques. This is because of the higher risks involved and the fact that this ship is my only airport. I have inventoried my gear and checked for proper operation of my survival radio. When checking my gear, I ensured that I knew where each item was stored and how to operate my LPA. In the water at night is not the time to learn about my survival equipment. I have red reflective tape on my helmet instead of paint, and I have reviewed my procedures for a helo pickup.

I guess that the extent of that one block on the brief sheet checked "blue water ops" is not as simple as it first appears, but with proper preparation and awareness of the many possible problems, I am ready to go out this Saturday night and forget about playing the BINGO game! ◄

Attagirl!

WHILE on detachment to NAS Pensacola in support of CNATRA carquals, AMHAN Debra A. Dupree of VT-9 was performing a routine check of nose gear downlock shims on a T-2. During the course of the inspection she discovered what appeared to be a minute fracture of the upper strut barrel. Further investigation revealed a severe crack in the strut assembly. Airman Dupree's attention to detail and professionalism averted a potentially catastrophic accident by preventing the scheduled launch of the *Buckeye* to the carrier. Attagirl, Airman Dupree, for this sharp-eyed performance!

LPA inflation valves safety wired with *stainless steel* wire.



This one is even complete with the lead seal.

Believe It or Not!

By AMEC James N. McAlister, USN
Naval Safety Center

ONE wonders why flightcrew life support equipment is ever kept in less than optimum condition. The very nature of life support equipment demands that it be ready to provide **life support** if needed.

Now, the best way to ensure that life support equipment will save a life is to give it TLC (tender loving care). By that we mean hang it up in a protected area when it's not in use. It would seem that the few who throw it around with disdain think it is something to be worn by edict rather than common sense.

TLC also includes a preflight to ensure it is capable of saving life and that the equipment is in proper working order.

TLC also means that if the equipment needs repair, for any reason, that the repair shall be made by a qualified person, using materials and methods specified by the manufacturer.

All of this adds up to common sense and yet, periodically, certain malpractices surface to make one think we have a corner on the *dummy* market. The accompanying photos bear this out. These photos depict the condition of a LAMPS det's aircrews' life preservers, obviously rendering the life preservers inoperable! ◄

LPA bladders patched with what appears to be fuel cell patching material.

Life Support Equipment demands the highest level of quality achievable. When the time comes for the equipment to do its job, nothing less than perfection is required to save the lives of aircrews.

CIVILIAN FLYING

By LTJG J. H. Craig
VQ-4

THE naval aviator is one of the best trained pilots the world has to offer, and he knows it! Being able to gracefully waltz that 160,000-pound *Herc* against the meteorological evils of the heavens, or to hit the pitching deck during marginal night weather in that lonely A-7 further instills the attitude that he is the best.

However, being the best doesn't mean you're invulnerable to accidents, especially in the "less complex" world of civilian aviation. During the past several years there have been many of the best who have flown their last flight in one of those light civilian planes.

With summer upon us, the desire may be there to leap into that small puddle jumper for the first time. Let's take a closer look at civilian aviation and examine some of the differences between military and civilian flying.

If you are one of those who is interested in becoming involved in general aviation – whether getting checked out in a Cessna 172, a twin-engine Beech Baron, or furthering your aviation skills by obtaining a more challenging flight certificate or rating – there's more to being qualified than just taking the written test. Whatever your ambitions, the first priority is to find a good flight school.

One of the best means is to contact the local GADO (General Aviation District Office) for a list of the FAA-approved flight schools in your area. As an FAA-approved flight school, the operation has followed and maintained strict guidelines and standards in flight instruction and aircraft maintenance.

The checkout you receive will depend mainly on the complexity of the aircraft (fixed gear, fixed pitch versus retractable gear, variable pitch) and the insurance requirements of the FBO (fixed-base operator). Being a military pilot with a couple of thousand hours in one of aviation's more complex airplanes won't justify a once-around-the-patch checkflight. Flying the light civilian aircraft can be, and probably will be, an entirely different flying experience. Being unaware of some of the peculiarities of civilian aviation could not only result in a flight violation, but more needlessly, an accident.

First of all, before jumping into the aircraft, it's more important than ever to determine the airworthiness of the bird. All civilian airplanes are required to have an airworthiness certificate placed inside the cockpit. However, this certificate does not guarantee the present maintenance integrity of the aircraft. This can only be left for the pilot to determine by means of a thorough preflight.

All civilian planes must have an annual inspection signed off by an IA (Inspection Authorization). Furthermore, those planes used for flight training or rentals must also have an inspection signed off within the last 100 flight-hours by an A

& P mechanic. If these inspections are not current, the aircraft is "hard down" and is illegal to fly until the inspections have been performed and signed off.

Those logbooks are similar to our yellow sheets in one respect: they show a maintenance history of the aircraft. Thus, any major maintenance problems can be detected by a careful study of these records. However, unlike the military maintenance sheets, any maintenance that is needed on the airplane, and has not yet been performed or signed off, isn't noted anywhere. Any uncorrected maintenance can only be detected by performing a thorough preflight, and this is a must since there's no longer a flight engineer or maintenance chief to ensure your aircraft's airworthiness. A kick-the-tires-and-jump-in routine is a dangerous practice that is only carried out by the incompetent. The aircraft that you are about to fly may have been sitting on the ramp for days without a soul near it. There are no longer support personnel around performing dailies on your aircraft; no one to drain the fuel lines of the water that has formed in the half-empty fuel cells. No matter how great your piloting skills are, you are betting your life on your preflight!

If you also think the days of figuring weight and balance, density altitude, etc. are over, you are wrong! Just because your Cessna 172 or Cherokee 6 has four or six seats doesn't mean they will carry four or six people with baggage, and a full load of fuel. They won't! There has been more than one pilot who has tried to take off with all seats filled, with the nose strut fully extended and the tail tiedown ring dragging, only to find he is unable to get out of ground effect. Hopefully he will see his mistake with plenty of time to abort, but some have not! (See "Wait and Balance," APR '79 APPROACH.)

The aircraft owner's manual is available to answer questions concerning speeds, power settings, weight and balance, etc. This manual is the civilian's counterpart to NATOPS, containing the needed information to fly the airplane safely. The manual should always be consulted before attempting to fly, especially in an unfamiliar aircraft. However, it must be made clear that the knowledge of the owner's manual does not replace a flightcheck with a knowledgeable flight instructor. The aircraft owner's manual is a handy reference, and should be used as such.

Once off the ground, you will no longer be governed by OPNAVINST 3710.7, but strictly FARs (Federal Aviation Regulations). A thorough knowledge of these regulations (mainly FAR, Parts 1, 61, 91, 97, and NTSB 430) is a must! The regulations cover everything from operational limitations to qualification requirements for flight certificates. Many of the regulations are similar to those used in Navy flying, but there are differences, and you must be aware of them! Many of these regulations are there to protect only the passenger, and it's left up to the pilot to look after his own six.

One of these regulations is the flight currency requirement. This regulation generally states that if you want to act as a pilot in command of an aircraft carrying passengers, you must have made three takeoffs and landings within the last 90 days.

With the exception of the biannual flight review, after a pilot obtains his license, there is no currency he has to maintain to fly solo. So, when flying civilian, a pilot must use sound judgment in determining his own proficiency. Carrying passengers after maintaining the bare minimums is dangerous. Even more unsafe is jumping into an aircraft by yourself after not operating one for months. It is all legal, but totally unsafe!

Even though the civilian aircraft doesn't have the complexity of the military aircraft, there are many inherent qualities that may be dangerous if one is unaware! Due to its lightness (most are less than 3000 pounds), the aircraft acts more like a falling feather than a propelled tank, with the wind controlling a large part of its destiny. However, it is not the wind while you are in the air that you are so much concerned with, but the wind when you are on the ground. To safely operate these airplanes on the ground, a pilot must correctly use the control surfaces (ailerons and elevators). If not used properly, and with sufficient winds, a pilot may find himself and the aircraft upside down. However, there may be times when the winds are so strong they overpower the effectiveness of the controls, and wingwalkers are required to safely maneuver the plane to its tiedown spot. Hopefully, through foresight, you won't get yourself into such an embarrassing and dangerous situation.

If your desires lie in flying a civilian twin, there are a few things that are very important to understand. With an additional engine, there is an added safety factor; however, it is quite the contrary when it's operated at the edge of its performance envelope. First, it is the same as a single-engine aircraft in the respect that, with full fuel, all passenger seats cannot be filled and the plane still operated safely. Some twins (Senecas, Apaches, old 310s), when loaded to gross weight, will only maintain a controlled descent to a landing straight ahead, on one engine. If a twin or single engine, in landing configuration, is not cleaned up immediately (gear up, flaps up, prop feathered), airspeed will be lost instantly and there is usually not enough power or altitude to get the airspeed back. The pilot must know, understand, and abide by the aircraft's performance limitations if he is to safely fly it.

LETTERS
to the editor

Photo Credit

Washington, DC – The cover picture for your FEB '80 issue should be credited to LT Gary J. Meyer, a member of Attack Squadron 196 aboard USS CONSTELLATION (CVA 64). It was taken in late fall, 1968, with a hand-held 35mm camera while en route for a low-level, night, road reconnaissance mission over North Vietnam. This photograph won first prize in the photography contest for the 1968-69 CONSTELLATION Cruise Book.

LT Meyer and his crewmate, LT Jack Babcock, were lost on a mission over Laos in December 1968.

CAPT L. C. Dittmar
Naval Air Systems Command

• **Our thanks for identifying the photographer of this fine cover photo.**

Re: "Guzzle Not!"

NAS Patuxent River – The article titled "Guzzle Not!" in the NOV '79 issue of APPROACH which discussed helicopter range and endurance optimization included several items that warrant additional comment.

The list of variables affecting range and endurance should also include temperature. The altitude variable is more appropriately termed pressure altitude.

Turboshaft engines operate more efficiently at higher altitudes due to *both* lower temperature, as stated in the article, *and* lower pressure. In fact, pressure is the dominating factor. Shaft specific fuel consumption (SSFC), the measure of efficiency, is an inverse function of pressure and an inverse function of the square root of temperature. For a normal temperature lapse rate, as the altitude increases, pressure and temperature decrease, resulting in a SSFC decrease. This assumes that the shaft horsepower (SHP) produced by the engine remains constant.

Higher is not always better, however! As altitude increases, power required increases. An altitude exists that optimizes the trade-off between SSFC and power required. Applicable NATOPS flight manuals should be consulted to determine the optimum altitude. As an example, the SH-3H with a gross weight of 20,000 pounds achieves maximum range at 2000 feet pressure altitude for standard temperature.

The article discusses maximizing range for headwind conditions, but no mention is made of tailwinds. With a tailwind, the maximum range airspeed will be less than for the no-wind situation. The same rule of thumb correction can be applied for normally encountered winds, except that the correction is subtracted. In no case will the maximum range airspeed be less than maximum endurance airspeed.

The statement, "Additionally, more than any other factor (save structural limits imposed by rotor blades), the dirty configuration and resultant parasite power losses may force undesirably low cruise airspeeds," implies that external stores cause a severe penalty for maximum range operations. First, a dirty configuration with its increased parasite drag results in parasite power *increases*. Second, the effect on maximum range is simply not that great for most helicopters. Data from the SH-2D NATOPS Flight Manual for maximum range show a 3½ percent range increase and a 2-knot airspeed increase with the MAD bird, support and reel, and smoke dispensers removed. As a possible worse case, the difference for an AH-1Q dirty (two M-200 rocket launchers and eight TOW launchers) and clean is a 10-knot decrease in airspeed and a 10 percent decrease in range.

The subject of shutting down an engine to increase range is an emotional issue, but one which should receive serious consideration by the pilot in command if an *in extremis* situation arises. *In extremis* can be translated to over water (especially cold water) and low or anticipated-low fuel state. It does not translate to flying over several suitable landing sites to get to the next RON point after a low fuel state is identified or fuel transfer problems develop. Since no sane pilot would plan a flight using single-engine range performance, we must assume he is placed *in extremis* by unanticipated circumstances – weather, aircraft systems failure, etc. When the consequences of fuel exhaustion (e.g., ditching) outweigh the possibility of engine failure for other reasons, then one engine should be shut down. Concern expressed in the article for engine maximum continuous operating limits becomes a moot point under these circumstances. If the flight manual shows that single-engine maximum range requires military power, then it should be used. Remember, military power typically has a 30-minute limit.

The article states that fuel can be saved by shutting down an engine during extended turning or taxiing operations on deck. This should be done *only* during turning operations and only if fire extinguisher and line personnel are available for start in accordance with NATOPS. It should *never* be done during ground taxi because of the possibility of ground resonance. The most effective emergency procedure for ground resonance is an immediate vertical takeoff – not normally possible with only one engine.

LCDR L. R. Ammerman
U.S. Naval Test Pilot School

A Misleading Statement

Point Mugu, CA – Your essay, "Gentlemen and Ladies, We're in the '80s," on the inside front cover of the JAN '80 issue of APPROACH contains a very misleading statement; i.e., "Use the new four-line release when we already have a few broken or tangled shrouds and it'll be like releasing our Koch fittings at altitude." This is not true! Using the four-line release with even extensive parachute damage will not cause parachute failure! However, since the aircrewman, after the emergency egress, is not in the position to judge parachute damage, current recommended procedures state, "Check your parachute. If there is any canopy damage or broken suspension lines, the four-line release system should not be used."

We should all work to increase aircrew confidence in personal survival equipment. One way to achieve this goal is to ensure that safety publications contain only correct statements, even in editorials.

Incidentally, the article, "The New Four-Line Release System" by LCDR H. T. Pheeny, MSC, USN (FEB '80 issue of APPROACH) describes the system very well.

LCDR Douglas W. Call, MSC
Pacific Missile Test Center

• **If the above-mentioned statement in our editorial was misleading, our apologies.**

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, VA 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

☆U.S. GOVERNMENT PRINTING OFFICE: 1980—635-048/7

Don't have the finger pointed at you...

because your quals are overdue.

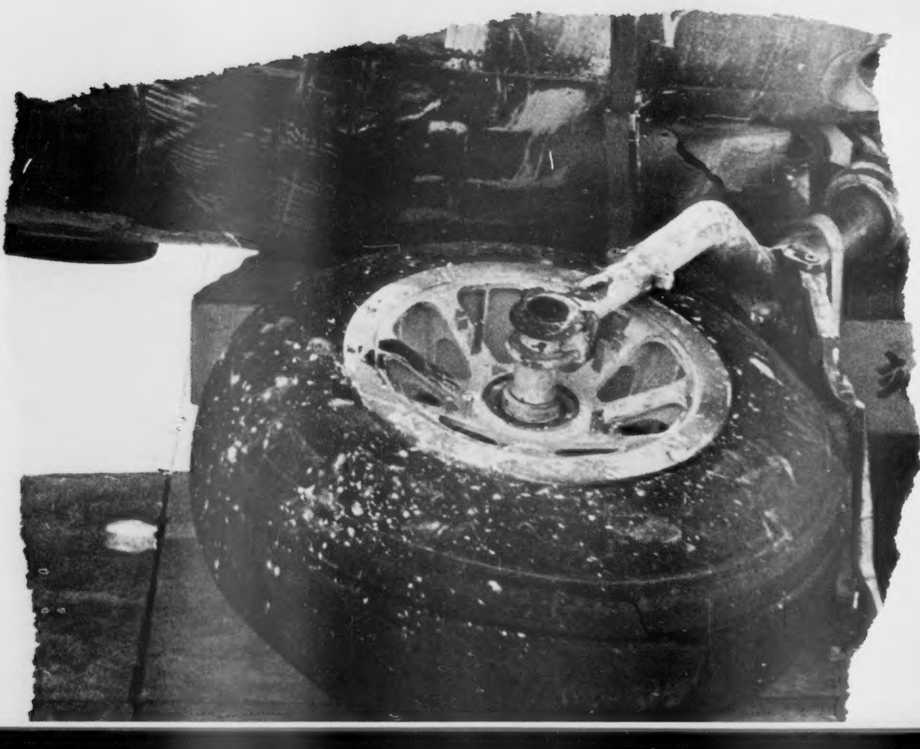
Naval Safety Center
NAS Norfolk, Virginia

Poster idea contributed by TD3 Anderson, HSL-31

NATOPS

It's better to read than bleed.

Poster idea contributed by TD3 Anderson, HSL-31.



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